Bill Brattin
<brattin@syrres.com>

09/20/2006 05:17 PM

To WarrenDEE@cdm.com, Bonita Lavelle/EPR/R8/USEPA/US@EPA

cc

bcc

Subject

Bonnie and Dee

here is our best thinking on Gerry's question about adding a second high flow filter if we stop the collection because it the filter is approaching overloading before the end of the collection interval.

1) If two sequential high flow filters are collected such that neither is overloaded, they must both be analyzed to span the full collection period. If pooling of results is ok (we think it is), then if the GOs are divided between the two filters in proportion to the time interval they represent, then the total number of GOs needed is the same if you analyze the 2 high flows or the one low flow. If you must average rather than pool, then you would have to count twice as many GOs in the two filter case as the one filter case. Thus, there is no inherent merit in putting in a replacement filter if the high flow begins to become overloaded.

2) However, there is also no inherent merit in stopping the high flow if it is loading up. By stopping it, the time period it represents becomes unequal to the full period low flow filter, so a stopped high flow, while not overloaded, is essentially useless. I think it would actually be better to let the high-flow run full period and overload. Then we would analyze the low flow sample, and the high flow could serve as a backup (via an indirect prep), if needed.

3) Pehaps the best is to collect two sequential high flows if overloading is occurring, and plan on analyzing only the low flow. The 2 high flows would then serve as backup. Only downside is the need to have a good way to label, track and recognize two sequential high flows. Not a real problem, just more work.

****

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Mary
Goldade/EPR/R8/USEPA/US
09/25/2006 03:04 AM

To Bill Brattin <brattin@syrres.com>
cc lavelle.bonita@epa.gov, obrien.wendy@epa.gov, miller.aubrey@epa.gov, peronard.paul@epa.gov
bcc
Subject Re: Revised section 4.6.2 of Ambient Air SAP

Bill- This looks great. One small revision: Please reference Lab Mod 29 as follow: most current version of Laboratory Modification Form(s) LB-000029.
Thanks,
Mary

-----Bill Brattin <brattin@syrres.com> wrote: -----

To: Mary Goldade/EPR/R8/USEPA/US@EPA
From: Bill Brattin <brattin@syrres.com>
Date: 09/22/2006 06:32AM
Subject: Revised section 4.6.2 of Ambient Air SAP

A few minor changes. Review this, ignore previous.

****

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Revised Section 4.6.2.doc

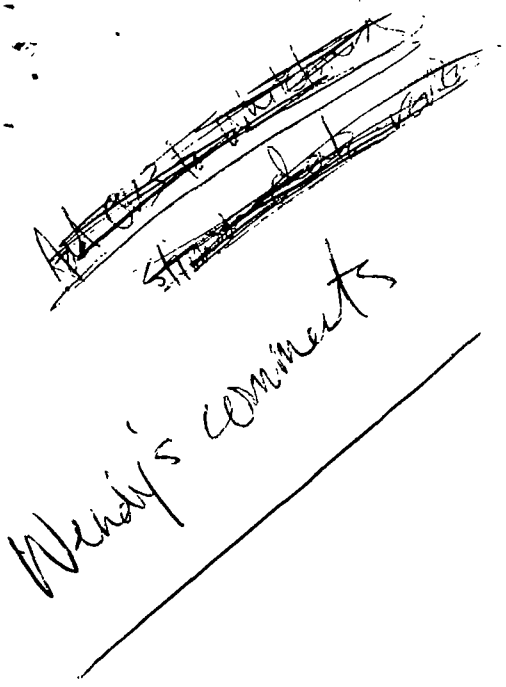
Co-located samples – Co-located samples are used to determine the variability of the measured parameter. Because co-located outdoor ambient air samples are expected to be very nearly identical in true concentration, a comparison of the results between the two samples will be interpreted primarily as a reflection of the variability in the analytical method, which includes random Poisson variation in the number of structures observed. The two results will be compared using an appropriate statistical test for the comparison of two Poisson rates, and the samples will be considered concordant if the rates are not statistically different.

Co-located samples will be collected at a frequency of one per sampling event (26 per year). Field co-located samples will be collected beside a field sample and given a unique index identification number. Field co-located samples should be collected from varying locations throughout the study area. The sampler will assign the same location ID to the co-located sample as the field sample, and will record the identification number of the field sample on the FSDS in the comments section. Co-located samples will be sent for analysis by the same method as field samples.

Results from co-located samples will be evaluated in accord with the criteria established in Libby Laboratory Modification Form LB-000029a (EPA 2003) for re-preparation samples, as follows:

Overall Concordance Rate	Evaluation
>95%	Good
90-95%	Acceptable
< 90%	Poor

If, after the collection of a minimum of 10 co-located samples, the overall concordance rate for co-located samples drops below 90%, EPA will investigate the basis for the discrepancy and take corrective action in sampling and/or analysis of the samples, as may be appropriate.



Draft
Sampling and Analysis Plan for Ambient Air Monitoring at the Libby Asbestos Site Libby, Montana

August 2006

Contract No. DTRS57-05-D-30109
Task Order No. 00006

Prepared for:

U.S. Environmental Protection Agency
Region VIII
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Denver, CO 80202

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Sampling and Analysis Plan for Ambient Air Monitoring at the Libby Asbestos Site Libby, Montana

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Approved by:_____ Date: _____
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Bonita Lavelle - Add

Robert Edgar NPL - Add
EPA Technical Assistance Unit

Contents

Acronyms

AHERA	Asbestos Hazard and Emergency Response Act
CAR	Corrective Action Request
CDM	CDM Federal Programs Corporation
COC	chain-of-custody
DQOs	data quality objectives
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FSDS	field sample data sheet
FSP	field sampling plan
Grace	W.R. Grace & Company
HASP	health and safety plan
LA	Libby amphibole
MCE	mixed cellulose ester
OU	operable unit
PM	project manager
PPE	personal protective equipment
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RPM	remedial project manager
SAP	sampling and analysis plan
S/cc	structures per cubic centimeter
SOP	standard operating procedure
TEM	transmission electron microscopy
µm	micrometer
Volpe	John A. Volpe National Transportation Systems Center
Zonolite	Universal Zonolite Installation Company and/or Zonolite Co.
%	percent
°F	degrees Fahrenheit

• change all to "Libby Asbestos Site"
↑ caps ↑ caps

• change all to "outdoor ambient air"

Section 1
Introduction

This document serves as the sampling and analysis plan (SAP) for an outdoor ambient air monitoring program to be initiated in August 2006 as part of the ongoing remedial investigation for the Libby Asbestos Site Operable Unit (OU) 4. This SAP outlines the sampling and analysis to be conducted by CDM Federal Programs Corporation (CDM) personnel during the collection of outdoor ambient air samples within the Libby Valley.

This SAP contains the elements required for both a field sampling plan (FSP) and quality assurance project plan (QAPP). This SAP has been developed in accordance with *EPA Requirements for Quality Assurance Project Plans* (EPA 2001) and the *Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G4* (EPA 2006a).

The purpose of this SAP is to describe the sampling objectives, locations, measurement methods, and data quality objectives (DQOs) for the ambient air sampling program. The SAP is organized as follows:

for use in quantitative risk assessment.

1.1 Objectives

This section defines objectives of the outdoor ambient air monitoring program and the intended use of the data. The primary objective of the program is to collect sufficient data of representativeness and quality to reliably characterize the long-term average spatial and temporal patterns of Libby amphibole (LA) in ambient air at the Libby Superfund site.

what's the scale of observation (both temporal & geographic) that must be defined?!

NOPE: cannot have (long term avg spatial & temporal patterns) both?

Objectives

- long term avg concs for BLRA purposes (OU4)
- differences in long term concs between spatial zones (which are?)
- seasonal differences in long-term conc

• effectiveness of remedy (thus need long-term monitoring as cleanup continues)

The specific activities detailed in this SAP will be used to implement and conduct a monitoring program for ambient air in the Libby Valley. Sampling will be conducted on a regular basis from multiple locations chosen to provide a good spatial coverage of the site, taking ~~predominate~~ wind patterns and the locations of known or suspected sources areas into ~~account~~.

1.2 Project Schedule and Deliverables

Sampling is expected to begin August 2006 and will continue on a regular schedule ~~until risk managers at the site~~ determine that the amount of data collected is sufficient to support final decision-making for this exposure pathway. Interim data reports summarizing all ambient air data collected to date will be generated no less than once every two months in order to keep project managers informed as to the data and findings.

Section 2
Site Background

This section describes the site location, history, and information regarding previous ambient air data.

2.1 Site Location

The Libby asbestos site is located within Sections 3 and 10, Township 30 North (T30N), Range 31 West (R31W) of the Libby Quadrangle in Lincoln County, Montana (Figure 2-1). The site includes homes and other businesses, which may have become contaminated with asbestos fibers as a result of the vermiculite mining and processing conducted in and around the City of Libby.

2.2 Site History

Vermiculite was discovered 7 miles northeast of Libby, Montana in 1881 by gold miners. In the early 1920s, Mr. Edward Alley began initial mining operations of this vermiculite ore body. Full-scale operations began later that decade under the name of the Universal Zonolite Insulation Company (Zonolite). This vermiculite ore body contains amphibole asbestos fibers with compositions including tremolite, actinolite, richterite, and winchite (herein referred to as LA) as defined by B.E. Leake, et al. (1997). Unlike the commercially exploited chrysotile asbestos, LA has never been used commercially on a wide scale, and, for the mine's operating life it was considered a byproduct of little or no value. The commercially exploited vermiculite was used in a variety of products, including insulation and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

The vermiculite ore was mined using standard strip mining techniques and conventional mining equipment. The ore was then processed in an onsite dry mill to remove waste rock and overburden material. Once processed, the ore was transported from the mine to the former screening plant, which sorted the ore into five size ranges. After the sorting process, the material was shipped to various locations across the United States, for either direct inclusion in products or for "expansion" prior to use in products. Expansion (also known as "exfoliation" or "popping") was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 degrees Fahrenheit (°F). This process explosively vaporizes the water contained within the phyllosilicate structure causing the vermiculite to expand by a factor of 10 to 15. This produces the vermiculite material most commonly sold as soil conditioner for gardens and greenhouses.

In Libby, operations handling this material occurred at four main locations: the mine and mill located on Rainy Creek Road on top of Zonolite Mountain; the former screening plant and railroad loading station located at the intersection of Highway 37 and Rainy Creek Road and directly across the Kootenai River, respectively; the former

expansion/export plant (the former export plant) located immediately west of Highway 37 where it crosses the Kootenai River; and at the former expansion plant located at the end of Lincoln Road, near 5th Street. The Lincoln Road expansion plant went off line sometime in the early 1950s. Investigations are underway to determine the exact location of this facility.

In 1963, the W.R. Grace Company (Grace) purchased Zonolite and continued vermiculite-mining operations in a similar fashion. In 1975, a wet milling process was added that operated in tandem with the dry mill until the dry mill was taken off line in 1985. The wet milling process was added to reduce dust generation during the milling process. Expansion operations at the former export plant ceased in Libby sometime prior to 1981 although this area was still used to bag and export milled ore until mining operations were stopped in 1990. Before the mine closed in 1990, Libby produced about 80 percent of the world's supply of vermiculite.

Since 1999, the U.S. Environmental Protection Agency Region 8 (EPA) has been conducting sampling and cleanup activities to address highly contaminated areas in the Libby Valley. The EPA investigation was initiated in response to media articles, which detailed extensive asbestos-related health problems in the Libby population. While at first the situation was thought to be limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities were affected.

Typically, the amphibole asbestos contamination found in the Libby Valley comes from one or some combination of "primary" sources: vermiculite mining wastes, vermiculite ores, vermiculite processing wastes, bulk residuals from vermiculite processing, "LA-containing rocks," or Libby vermiculite attic insulation. Asbestos from these primary sources has been found in interior building dust samples and local soils, which in turn act as secondary sources. To date, the goal of EPA has been to find and identify areas with elevated levels of asbestos (the primary sources) and to remove them. EPA has conducted contaminated soil removals at the former export plant location, the former screening plant and adjacent properties, and several residential properties with asbestos source materials present. Three schools in the Libby school system have also had removals performed. Details of these operations can be found in the applicable action memorandums, filed at the Information Center in Libby.

Cleanup work in Libby is proceeding with the removal of previously identified primary outdoor source areas and the removal of vermiculite containing insulation from buildings in the Libby Valley is ongoing. The remedial investigation is ongoing and continues to identify properties that require cleanup.

For long-term management purposes, the Libby asbestos site has been divided into two OUs: OU3, which represents the former mine and Rainy Creek Road, and OU4, which represents the remainder of the Libby Valley.

2.3 Summary of Ambient Air Monitoring in Libby

Beginning around 2000, EPA collected ambient air samples at a number of locations around Libby in order to gain an initial understanding of the levels of LA typically observed in outdoor air. Locations where samples were collected included:

- Fitness Center at the City Hall Building (952 East Spruce Street)
- McGrade Elementary School (899 Farm to Market Road)
- Plummer Elementary School (247 Indian Head Road)
- Rainy Creek Road
- Lincoln County Courthouse Annex (418 Mineral Avenue)
- Lincoln County Landfill
- Station FA-1 (on the northwestern boundary of the River Runs Through It subdivision)
- Stimson Lumber Property

In addition, samples of ambient air were collected at 27 properties in Libby where EPA clean-up activities were scheduled. These samples were collected before clean-up began, and the measurements were intended to help determine if the clean-up activities caused a measurable release to ambient air.

The results of these samples were evaluated in the Summary of Asbestos Levels in Ambient Air in Libby, Montana report prepared by EPA (EPA 2005). The conclusions of this report were as follows:

- ~~LA occurs~~ in ambient air in Libby.
- Sources of the LA fibers found in ambient air in Libby are not known with certainty, but is seems likely that windborne transport of particles that are present in soils and dust around the community is one important component.
- Concentration levels do not appear to be substantially different at different locations within the main residential-commercial section of Libby, but may be [redacted] higher closer to the mine.
- ~~The levels of LA found in ambient air around Libby are similar to levels of asbestos that have been observed in outdoor air in other locations.~~
- Current data are too limited to determine if any time trend towards reduced levels in ambient air is occurring as a result of on-going EPA clean-up activities, but collection of additional current and future ambient air data will help answer this question.

Related to the risk that LA in ambient air poses, the EPA report (EPA 2005) concluded the following:

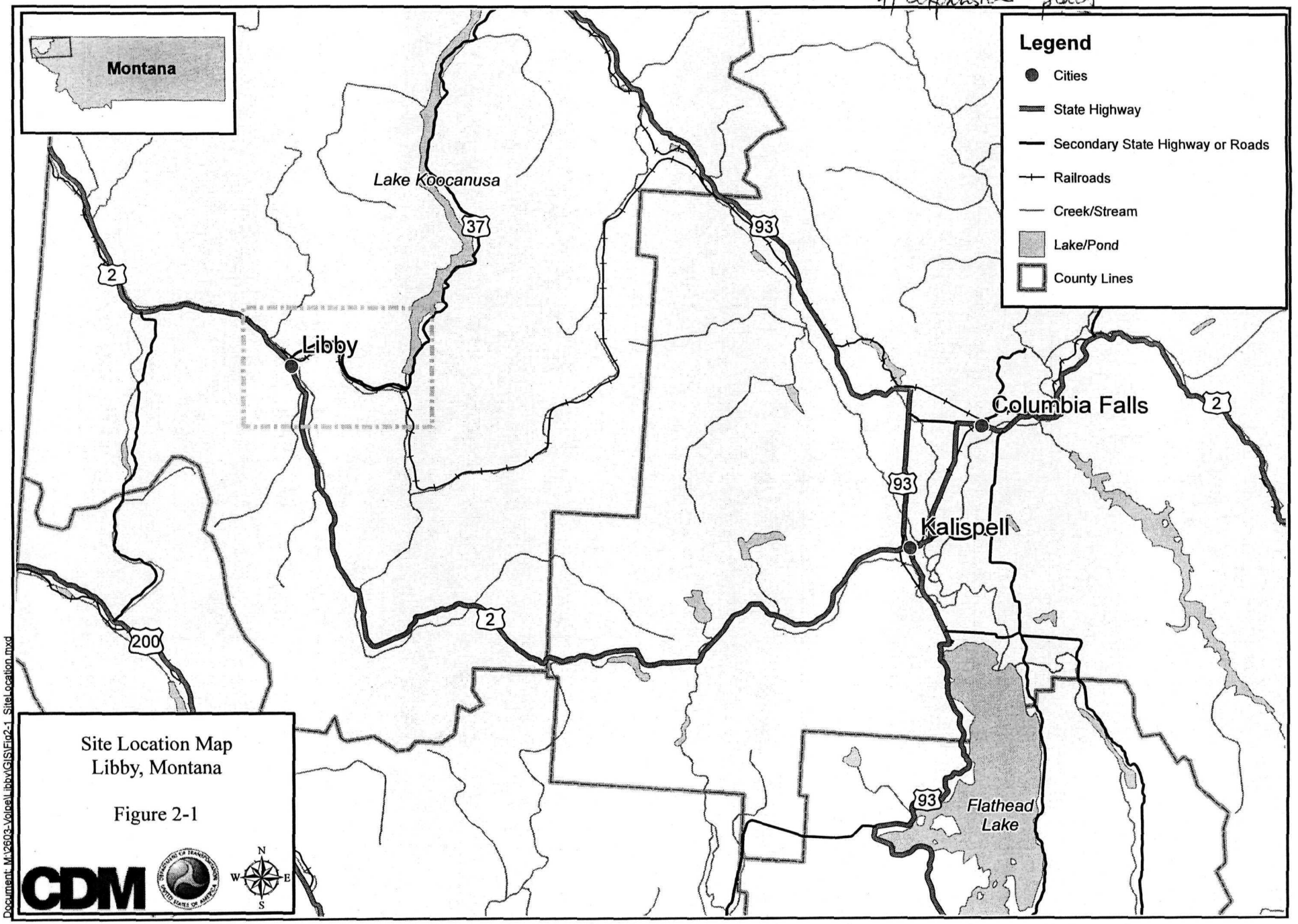
> *"If an individual were exposed to the observed concentrations of LA in ambient air for a lifetime, excess cancer risks based on both risk models (EPA 1986 and EPA 2003) would fall within the range that EPA usually considers acceptable (less than 1E-04). However, it should be remembered that people may be exposed to LA by other pathways in addition to ambient air, so cumulative risks will be higher than for ambient air alone. These risk estimates may be revisited and appropriately revised as new data or risk models, including models for non-cancer risks, become available."*

During the analysis of the available ambient air data for the 2005 EPA report several important limitations of the document and the data were discovered; these limitations were summarized in a letter from EPA (EPA 2006b), and are presented below:

- Data presented in the report are incomplete because of lack of seasonal and geographic representation over time, and there are an insufficient number of data points at adequate sensitivity.
- The analysis presented preliminary assumes that "non-detect" values are equal to zero. USEPA Region 8 is currently reviewing this approach for analyzing "non-detect" results.
- The methodology for estimating risk ranges is preliminary and should be considered draft.
- Evaluation of risk in the document is limited to a single pathway and does not address cumulative exposure from multiple pathways at the Site.

The letter from EPA (EPA 2006b) also summarizes the need for further investigations of outdoor ambient air in Libby and its vicinity, specifically: collection of additional outdoor ambient air data; refinement of the methodology for estimating risk ranges for the Libby population; and consideration of cumulative exposures in evaluating risk.

Provide Addtl map showing location of
1) Mine & mill or tentative mine
2) screening plant
3) export plant
4) expansion plant



Section 3
Data Quality Objectives

The DQO process is a series of planning steps based on scientific methods that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop site-specific DQOs (EPA 2006). These guidelines were followed for the development of the DQOs presented in this section.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps ~~of which~~ the output from each step influences the choices that will be made later in the process. These steps include:

1. State the problem
2. Identify the decision
3. Identify the inputs to the decision
4. Define the study boundaries
5. Develop a decision rule
6. Specify tolerable limits on decision errors
7. Optimize the design

3.1 Step 1 – State the Problem

The purpose of this step is to describe the problem to be studied so that the focus of the investigation will be unambiguous.

As determined by previous investigations conducted at the site, LA is present in multiple environmental media in Libby including: indoor air, outdoor ambient air, indoor dust, vermiculite insulation, and soils. As a result, residents of Libby may be exposed to LA as structures present in ambient outdoor air. The current data set for LA concentrations in ambient air, specific to Libby, is not extensive enough to support ~~final~~ risk management decisions for this exposure pathway. As a result, the field activities described in this SAP will be used to collect ambient air data for use in characterizing spatial and temporal patterns of LA concentrations in ambient air, which in turn will be used to support improved estimates of exposure and risk calculations at the site.

3.2 Step 2 – Identify the Decision

This step identifies what questions the investigation will attempt to resolve and what actions may result.

The purpose of investigating LA levels in ambient air is to determine the level of excess cancer risk posed to area residents and workers by ambient air under current site conditions and as a function of time as site cleanup continues, in order to decide if additional clean-up actions are needed to reduce or eliminate sources of LA contamination in Libby that contribute to ambient air.

3.3 Step 3 – Identify the Inputs to the Decision

The purpose of this step is to identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statements.

The data required to make the risk management decision are reliable and representative (over space and time) data on the long-term average concentration of LA in ambient air at various sub-locations of the site.

In this regard, it is important to recognize that there are several alternative strategies for specifying the concentration of asbestos in air and in using those data to estimate exposure and risk. At present, final decisions have not been made regarding which approach(s) will be used, so it is important that the data obtained provide full details on the particle size (length, width, mineral type) of all asbestos structures observed, so that these data can be used to compute the appropriate concentration values for use in whatever alternative risk models may be selected for use at the site.

3.4 Step 4 – Define the Boundaries of the Study

This step identifies the target population of interest and specifies the spatial and temporal boundaries of this investigation.

Spatial Bounds

The study will include collection of data that is representative of the entire Libby Superfund site. Priority will be assigned to those areas that constitute the main commercial/residential areas of Libby, since this is where the majority of area residents and workers are most likely to be exposed. However, other areas of the site will also be characterized. In addition, samples will be collected at ~~12~~ 10 stations that are judged to be at a sufficient distance from the site that impacts from past or present releases of LA are likely to be insignificant. Data from these stations can help provide a useful frame of reference for assessing the magnitude of site-related releases to ambient air.

Temporal Bounds

The program will begin in August 2006 and will extend until the data are judged to be sufficiently reliable to support final risk management decisions for this pathway. Because it is expected that there will be substantial between-sample variability between locations and as a function of time, it is anticipated that the program will likely endure for at least ~~10~~ 15 years before sufficient data are available to provide a clear characterization of long-term spatial and temporal patterns.

3.5 Step 5 – Develop Decision Rules

The purpose of this step is to describe the method that EPA will use to make final risk management decisions from the data.

At present, risk management decision rules for the site have not yet been defined. However, it is anticipated that the decision will likely take the form of specifying the maximum residual excess cancer risk that may be left in place without triggering the need for additional cleanup. Because ambient air is only one of several pathways that will be evaluated as part of the risk assessment, it is expected that the decision rule for ambient air will take the form that the residual risk contributed by this pathway may not exceed some specified level (either an absolute level or alternatively, some proportion of the total risk).

In the absence of a quantitative decision rule, it is tentative assumed for the purposes of planning the monitoring program that ambient air will be considered to be of ~~potential concern if risks from this pathway exceed a level of about 1E-05, and that~~ risks will be considered to be *de minimis* if risks are less than about 1E-06. This assumption for planning purposes should not be interpreted as a risk management decision, but only a method to support initial efforts to plan the monitoring program.

3.6 Step 6 – Specify Tolerable Limits on Decision Errors

The tolerable limits on decision errors, used to establish performance goals for the data collection design, are specified in this step.

In making risk management decisions with calculated estimates of exposure and risk, two types of decision errors are possible:

- A Type I (false negative) decision error would occur if a risk manager decides that exposure to ambient air is not of significant health concern, when in fact it is of concern.

- A Type II (false positive) decision error would occur if a risk manager decides that exposure to ambient air is above a level of concern, when in fact it is not.

EPA is most concerned about guarding against the occurrence of Type I errors, since an error of this type may leave humans exposed to unacceptable levels of LA. For this reason, it is anticipated that exposure assessment for ambient air will be based on the best estimate and the 95% upper confidence limit (UCL) of the long-term average concentration of LA in some specified location. Use of the UCL to estimate exposure and risk helps account for limitations in the data, and provides a margin of safety in the risk calculations, ensuring that risk estimates are unlikely to be too low.

3.7 Step 7 – Optimize the Design for Obtaining Data

This step identifies a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

Estimating the Number of Samples Required

The method used to compute the UCL of a set of ambient air samples depends on the statistical properties of the data set. Based on data available to date, it appears that the variability between ambient air samples may be approximated by a mixed Poisson lognormal (PLN) distribution. Statistical procedures are available to estimate the parameters of the underlying lognormal distribution (Haas et al. 1997), and these fitted parameters may be used to compute the UCL of the mean using the approach for lognormal data sets described in USEPA (2002). Based on this approach, the relationship between the UCL and the mean of a set of samples is given by

$$\frac{UCL}{Mean} = \exp[\sigma H / \sqrt{(n-1)}]$$

where:

σ = log standard deviation of the measured values
H = statistic described in USEPA (2002)
n = number of samples

Based on available data, a rough approximation for σ for ambient air samples from the main part of Libby (Zones 1-3) is 1.9. Based on this rough estimate, the ratio of the UCL to the mean as a function of n is expected to be approximately as shown in Figure 3-1. As seen, the ratio (a measure of uncertainty) approaches a value of about 2 as the number of samples approaches about 80-100, and continues to decline slowly as the number of samples increases.

Based on this, it is expected that if a total of about 80-100 samples per exposure area were collected, the uncertainty in exposure estimates would be limited to about a factor of two, and that additional numbers of samples would be unlikely to result in a substantial decrease in uncertainty.

Estimating the Required Analytical Sensitivity

In general, it is desirable that the analytical sensitivity for a set of samples be such that the contaminant would be detected and quantified with confidence if it were present at a level of potential health concern:

Target Analytical Sensitivity ≤ Level of Concern

As noted above, for the purposes of this planning document, it is assumed that the level of concern for ambient air is no greater than 1E-05. The concentration of LA that corresponds to this target risk level depends on the risk method used, and the assumed extent of human exposure. For planning purposes, it is conservatively assumed that exposure to outdoor air occurs 8 hrs/day for a lifetime (actual exposures are likely to be lower than this for most people). Based on this assumption, and employing EPA's currently recommended risk model (IRIS 2006), the level of concern for LA in air would be about:

Level of Concern = 1E-05 / (8/24 · 0.23) = 0.0001 PCM s/cc

Need map of input

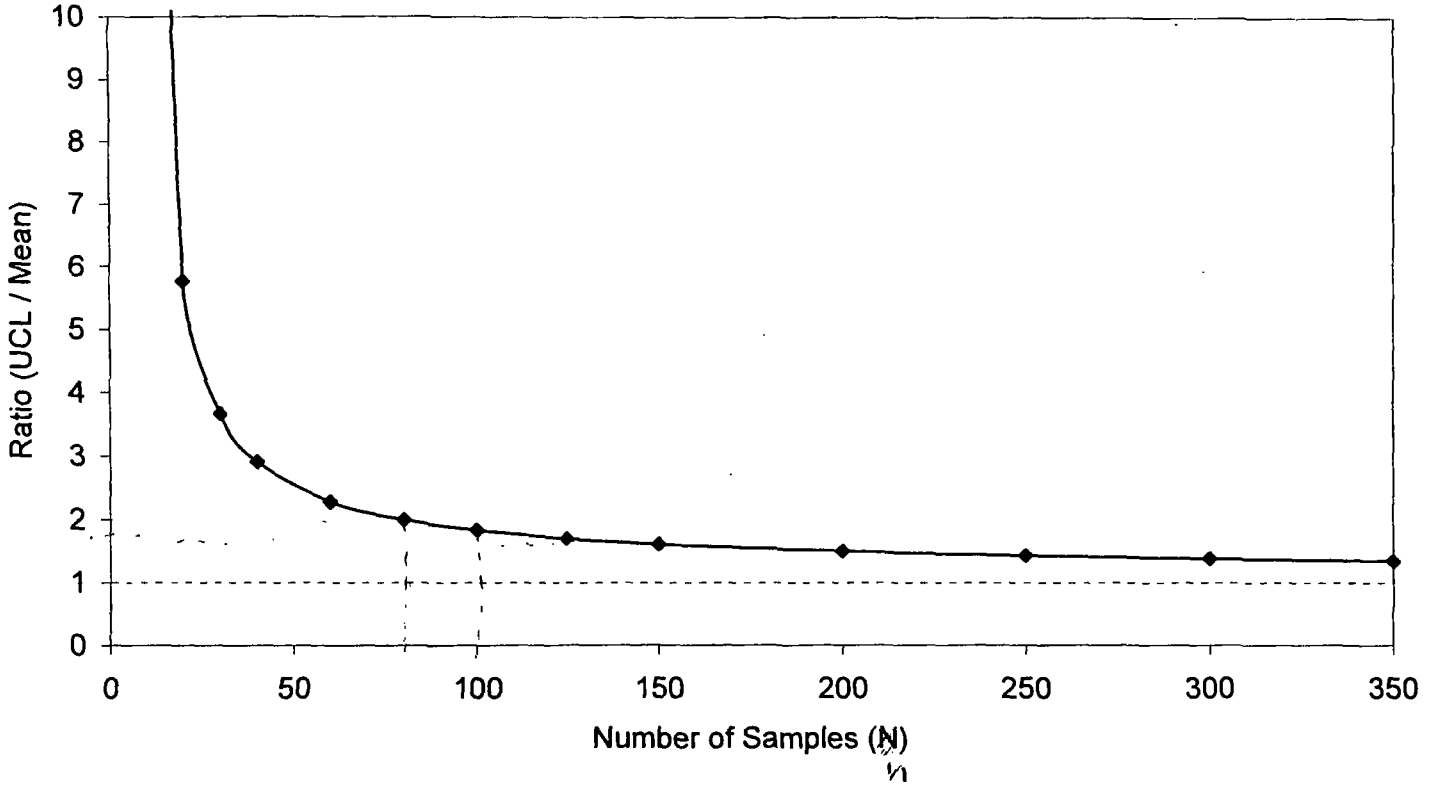
Thus, the target analytical sensitivity for ambient air samples should be about ~~0.0001~~ cc^{-1}. (0000)

Refinements to the Design as Data are Collected

In accord with EPA's DQO process, it is expected that the ambient air monitoring program described in this document may be modified periodically as data are obtained. For example, if data suggest that time variability is low, then sampling frequency might be decreased. Alternatively, if data suggest that spatial variability is higher than expected, then additional sampling stations may be added to better characterize the spatial variability. Similarly, the target analytical sensitivity may be either increased or decreased, depending on the detection frequency and mean values observed in initial samples results.

D.: Need to make sure these objectives are included in DQOs.

Figure 3-1 Number of Samples Versus the Ratio of UCL to Mean (a measure of uncertainty)



$$\frac{UCL}{Mean} = \exp\left[\sigma H / \sqrt{(n-1)}\right]$$

σ = log s.d. of ward values
H = stat as in USCM 2002

Section 4
Sampling Program

This section provides brief summaries of SOPs and additional site-specific detail that may not be discussed in the SOPs. The site-specific procedure will be followed during this investigation. For additional information, field personnel will refer to the SOPs included in Appendix A. The site health and safety plan (HASP) should be consulted to determine health and safety protocols for performing site work. The SOPs and site-specific procedures included in Appendix A are listed below (CDM 2005b):

- Sample Custody (SOP 1-2)
- Packaging and Shipping of Environmental Samples (SOP 2-1)
- Guide to Handling of Investigation-Derived Waste (Modified SOP 2-2)
- Field Logbook Content and Control (SOP 4-1)
- Photographic Documentation of Field Activities (Modified SOP 4-2)
- Control of Measurement and Test Equipment (SOP 5-1)
- EPA Guidelines (SOP 2015) - Asbestos Air Sampling

The following sections are a summary of field activities that will be performed in accordance with this SAP by CDM during the ambient air sampling investigation.

4.1 Pre-Sampling Activities

Prior to beginning field activities, a field planning meeting will be conducted and an inventory of supplies will be performed to determine procurements needs. The following sections discuss these pre-sampling activities.

4.1.1 Field Planning Meeting

Prior to beginning field activities, a field planning meeting will be conducted by the CDM project manager (PM) and attended by the field staff and a member of the CDM quality assurance (QA) staff. The agenda will be reviewed and approved by the QA staff and the health and safety officer prior to the meeting. The meeting will briefly discuss and clarify:

- Objectives and scope of the fieldwork
- Equipment and training needs
- Field operating procedures, schedules of events, and individual assignments
- Required quality control (QC) measures
- Health and safety requirements

- Documents governing fieldwork that must be on site
- Any changes in the field plan documents

A written agenda, reviewed by the CDM QA staff, will be distributed and an attendance list signed. Copies of these documents are maintained in the project files, in the CDM Denver office. Additional meetings will be held when the documents governing fieldwork require it or when the scope of the assignment changes significantly.

The field team personnel will perform the following activities before and during field activities, as applicable:

- Review and understand this SAP and HASP
- Ensure that all sample analyses are scheduled through the laboratory
- Obtain required sample containers and other supplies
- Obtain and check field sampling equipment
- Obtain personal protective equipment (PPE)

4.1.2 Inventory and Procurement of Equipment and Supplies

The following equipment will be required for sampling activities, and any required equipment not already contained in the field equipment supply inventory will be procured prior to initiation of sampling activities:

- Field logbooks
- Indelible ink pens
- Digital camera
- Sample media: 0.8 micrometer (μm) pore size, 25-millimeter diameter mixed cellulose ester (MCE) filter cassettes.
- Sample paperwork and sample tags/labels
- Custody seals
- Zipper-top baggies
- Air sampling equipment as described in EPA SOP 2015
- PPE as required by the HASP

4.2 Field Documentation

Field documentation to be generated during this sampling study includes the following: logbooks, FSDSs, photographs, and sample custody documentation. The following sections describe the types of documentation as well as how field

documents will be corrected if errors occur and the process for documenting deviations from field procedures prescribed in this SAP.

4.2.1 Field Logbooks and Records

Field logbooks will be maintained in accordance with CDM SOP 4-1, Field Logbook Content and Control (Appendix A). This log is an accounting of activities at the site and will note problems or deviations from the governing plans and observations relating to the sampling and analysis program. Field administrative staff will manage the logbooks and FSDS and will send original field logbooks, as they are completed, to the CDM project file repository in Denver, Colorado for document control. A copy of each logbook will be maintained in the CDM office in Libby, Montana.

Detailed sampling notes will be recorded for each sample on an FSDS (Appendix B). Field administrative staff will manage the FSDSs and will send copies to the CDM project file repository in Denver, Colorado for document control and a copy to the Volpe Center for data entry required in the project database. Original FSDSs will be maintained in the CDM office in Libby, Montana.

4.2.2 Photographic Documentation

Photographic documentation will be recorded for each sampling location (at first collection event) and at any place the field sampling personnel determine necessary with a digital camera in accordance with CDM SOP 4-2, Photographic Documentation of Field Activities (Appendix A) with the following site-specific modifications.

Section 5.2.2, General Guidelines for Still Photography - A slate is not required for each new roll of film. The information for the slate will be recorded in the field logbook (i.e., direction of the photograph, surrounding landmarks, etc.). All team members, as stated in the logbook, will be photographers and witnesses at the locations. Slates are not required for close-up photographs, and instead the required information can be listed in the digital photograph file name. File names will be in the format: last name of property owner_address_AAS_date, where:
AAS = Ambient Air Sampling
Date = MM/DD/YY

A color strip is not required for close-up or feature photographs.

Section 5.2.4, Photographic Documentation - The name of the laboratory, time and date of drop-off, and receipt of film is not required to be recorded for this project.

Section 3.3.2, Archive Procedures - Digital photographs will be archived on the CDM Libby Server (secure) with nightly backup. These files will be archived until project closeout, at which point project management will determine a long-term electronic file storage system.

4.2.3 Sample Labeling and Identification

Samples will be labeled with index identification numbers supplied by field administrative staff, and will be signed out by the sampling teams (i.e., controlled). One sample label will be placed on the sampling cassette. The sample identification

number will also be written on the outside of the plastic bag used to hold the sampling cassette during transport.

Sample index identification numbers will identify the samples collected during the ambient air study by having the following format:

AA-#####

Where: AA = Ambient air
= a sequential five digit number

4.2.4 Field Sample Custody and Documentation

Sample custody and documentation will follow the requirements specified in CDM SOP 1-2, Sample Custody (Appendix A). All samples and sampling paper work will be relinquished to the sample coordinator at the end of each day. Field administrative staff will be responsible for management of all field forms.

4.2.5 Corrections to and Deviations from Documentation

Logbook modification requirements are described in CDM SOP 4-1, Field Logbook Content and Control (Appendix A). For the logbooks, a single strikeout initial and date is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. These procedures will also be followed for the correction of any field form. All deviations from the guiding documents will be recorded in the logbooks and the Libby Asbestos Project Record of Modification Form (Appendix C). Any major deviations will be documented according to the CDM quality management plan (CDM 2005a).

4.3 Ambient Air Sampling

The following sections describe the process of selection of ambient air sampling locations, the procedures for sample collection, and requirements for collection and submission of QA/QC samples.

4.3.1 Selection of Ambient Air Sampling Locations

Ambient air sampling will be conducted at 21 specified locations (Figure 4-1). These locations were selected based on prevailing wind directions in the Libby Valley (northeast/southwest), year-round accessibility, and distributed to ensure adequate spatial coverage.

Eleven of the eighteen sampling locations are in the main residential/commercial area of Libby; know as zones 1, 2, and 3 (as described in the Ambient Air Report [EPA 2005]). These locations are:

- 1047 Sheldon Flats (private residence)
- 1427 Highway 37 N (commercial building)
- 1915 Kootenai River Road (private residence)
- 475 Fish Hatchery Road
- 501 Mineral Avenue (commercial building)
- 60 Port Blvd (commercial building)

- Cabinet View Golf Course
- J. Neils Park
- Libby Middle School
- McGrade Elementary
- Plummer Elementary

Five additional sample locations were placed along the Highway 37 corridor, beginning at the Libby Dam, to evaluate ambient air concentrations in this area. These locations are listed below:

- Libby Dam Visitor's Center
- Forest Service Offices at Canoe Gulch (12557 Highway 37 North)
- 105 River Run Lane (private residence)
- Guard house at intersection of Rainy Creek Road and Highway 37 North
- River's Edge Mobile Home Park (462 Highway 37 North)

Two sample locations are near the northwestern and southeastern boundaries of the Libby Valley:

- 245 Cedar Meadow Road (private residence)
- Fisher River Road rip-rap pit (3 miles south of Highway 37 North)

Two sample locations are in OU3 to characterize the LA concentrations in the area of the mine and Rainy Creek Road:

- summit of Libby mine
- amphitheater on Rainy Creek Road between Highway 37 and the tailings pond

One of the above mentioned sampling locations, the rip-rap pit on Fisher River road, and the final sampling location, Libby Airport, will be used to collected samples from areas that are considered background.

Ambient air sampling pumps will be placed on the east or west side of buildings approximately 15 feet away from outer walls to reduce building interference with wind patterns and allow the samples to be exposed to the dominant northeast to southwest air patterns in the valley. Sample locations should be chosen so that particulates generated by automobile traffic on dirt and gravel roads will be minimized. All samples will be collected from the height of an adult's breathing zone, approximately between 4.5 and 5 feet above ground level by using lengths of tygon tubing that reach from the sampling pump positioned near the ground to a sampling stand designed to hold the sampling media at desired heights.

4.3.2 Collection of Ambient Air Samples

Weather permitting, ambient air samples will be collected from each of the 21 specified sampling stations once every two weeks[a]. As noted above, the full duration

[a] Note: stations along Rainy Creek Road and the mine may not be accessible at some times during the winter.

of the monitoring program can not be specified with certainty at this time, but it is expected that the program will last for at least a year, and may extend beyond that point. This will result in the collection of a minimum of [redacted] additional ambient air samples. This number is expected to provide a good characterization of both spatial and temporal variability, even if it is necessary to divide the site into several sub-areas to account for spatial variations. For example, if five sub-areas were delineated as exposure areas for use in the risk assessment, if there were about 4 stations in each area, the number of samples from each area would be about 100 per year, which is expected to yield data of sufficient quantity and quality to provide reliable estimates of the mean and the UCL of the mean of the long-term average concentration (see Section 3.7, above).

At least [redacted] sampling event each month will be coordinated with the Lincoln County particulate monitoring program to provided data to correlate observations of asbestos in air samples to particulate concentrations in ambient air.

Ambient air samples will be collected and equipment calibrated in accordance with EPA SOP 2015 (Appendix A) for asbestos sampling. The samples will be collected using high flow air pumps and 25-millimeter diameter, 0.8µm pore size MCE filter cassettes.

The target volume of air to be sampled will initially be 15,000 liters over 32 to 36 hours at a flow rate of approximately 8 liters per minute. As samples are initially collected during this program and analyzed, the flow rate and sample time may be adjusted to ensure the sample filter has proper loading for the required analytical analysis and sensitivity goals.

To further insure the collection of viable samples, an additional sample will be collected at each sampling location with a flow rate of 5 liters per minute over the same period of time. The sample collected at 5 liters per minute will initially be archived. Analysis of the sample collected at the lower flow rate will occur if the sample collected at the higher flow rate is not able to be analyzed by the required method due to overloading on the sample filter.

Sample collection will begin over a 3 to 4 hour period on a predetermined day of the week. Each sample cassette will be checked every 6 to 8 hours for visible loading. If visible loading is observed on a filter, the collection of that sample will be concluded and the sample submitted for analysis. Samples will not be submitted on more than one cassette if visible loading is observed, instead the analysis of the sample will be modified (more grid openings counted) to ensure the appropriate analytical sensitivity is reached.

4.3.3 Chain-of-Custody Requirements

COC procedures will follow the requirements as stated in CDM SOP 1-2, Sample Custody with modification (Appendix A). The COC record is used as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A complete COC record is required to accompany each shipment of samples.

At the end of each day, all samples will be relinquished to the sample coordinator by the sampling team following COC procedures. The sample coordinator will follow COC procedures to ensure proper sample custody between acceptance of the sample from the field teams to shipment to the laboratory.

4.3.4 Sample Packaging and Shipping

Samples will be packaged and shipped in accordance with CDM SOP 2-1, Packaging and Shipping of Environmental Samples, with modification (Appendix A). A custody seal will be placed so that both ends of the sampling cassette are covered by the seal. If an overnight delivery service is used to ship the samples, the samples will be secured for shipment in a rigid container with sufficient packing material to prevent dislodging the collected fibers. Vermiculite, shredded paper, or expanded polystyrene cannot be used as packing material.

4.4 Equipment Decontamination

Sampling will be completed with dedicated field equipment and equipment decontamination will not be required for the activities described in this SAP.

4.5 Handling Investigation Derived Waste

Any disposable equipment or other investigation derived wastes will be handled in accordance with CDM SOP 2-2 with site-specific modifications, Guide to Handling of Investigation-Derived Waste (Appendix A).

4.6 QA/QC Activities

This section describes the QA/QC activities that will be conducted to insure samples collected during this effort are of sufficient quality to meet the project DQOs.

4.6.1 Calibration and Control of Sampling Equipment

Prior to the collection of samples, sampling pumps will be calibrated to the required flow rate by use of a primary calibration standard or an adequately maintained secondary calibration standard according to CDM SOP 5-1, Control of Measurement and Test Equipment (Appendix A) and EPA SOP 2015 (Appendix A).

4.6.2 Collection of QA/QC Field Samples

Three types of QA/QC samples will be collected as part of this investigation: lot blanks, field blanks, and replicate samples.

Lot blanks - Before samples are collected, two cassette lot blanks from each filter lot of 100 cassettes will be randomly selected and submitted for analysis. The lot blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. The entire batch of cassettes will be rejected if any asbestos fiber is detected on the lot blanks.

Field blanks - One field blank will be collected and analyzed per week for this sampling study, as described in field modification LFO-000064. If asbestos fibers are observed on a field blank others collected during that week will be submitted for

* What about meteorological stations? Where? How many?

analysis to determine the potential impact on sample results. The field blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. The blanks will be collected at varying locations throughout the week (one collected at a different location on each day of the week).

? is this adequate? Ask Mary

Replicate samples: Replicate samples will be collected at a frequency of 5% (1 in 20). Field replicates will be collected beside a field sample and be given a unique index identification number. Replicate samples should be collected from varying locations throughout the study. The sampler will assign the same location ID to the replicate as the field sample, and will record the identification number of the field sample on the FSDS in the comments section. Replicate samples will be sent for analysis by the same method as field samples.

Collect every 3 days at each of 21 sampling ~~locations~~ stations.

⇒ Per month: ~10 samples at each of 21 sampling ~~locations~~ stations

10 x 21 = 210 total samples/month

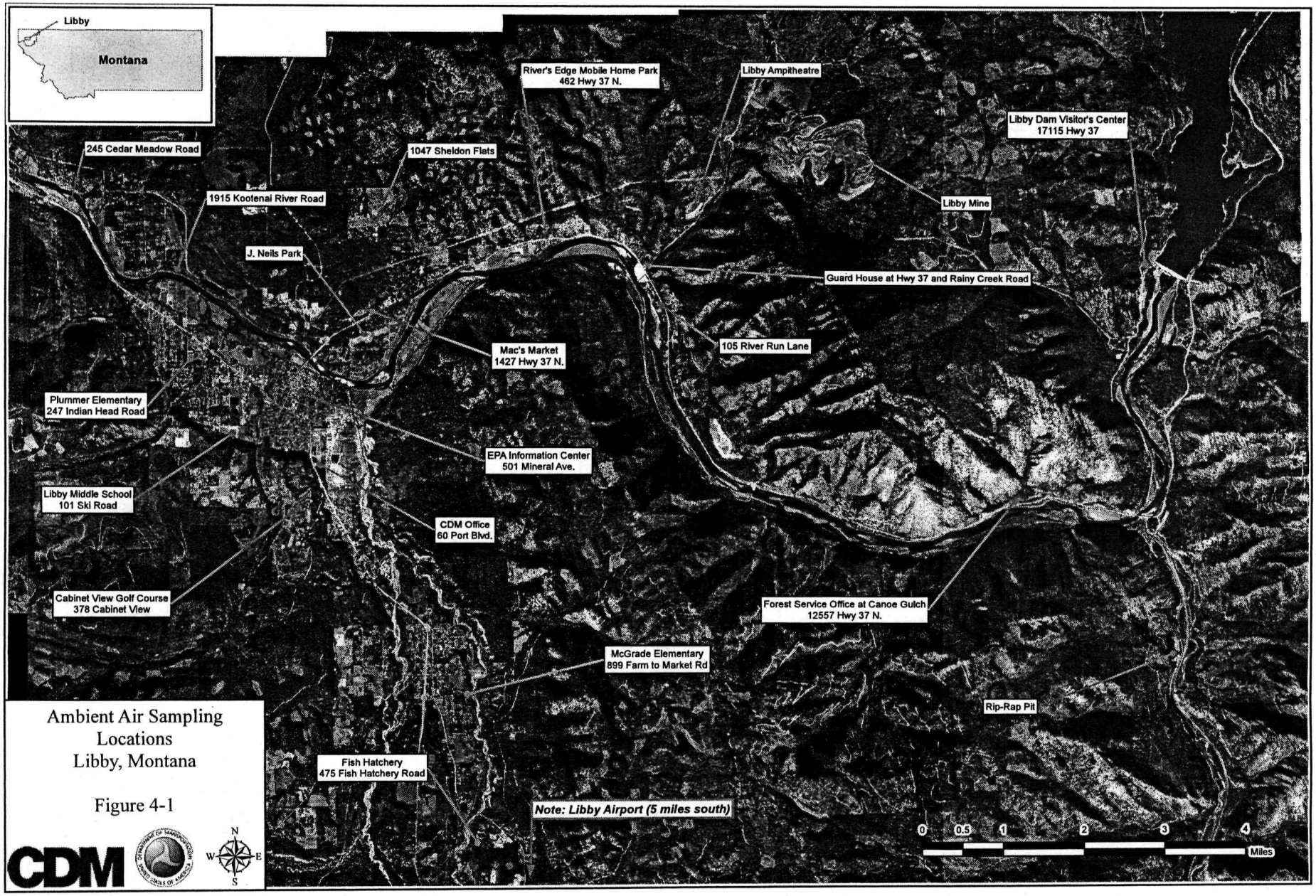
⇒ Per year: ~ 120 samples at each of 21 sampling stations

120 x 21 = 2520 total samples/year

How many/which samples are archived/analyzed will depend on our DQOs:

- avg long-term conc. of LA in out. amb. air (BRT)
- evaluation of short-term (subchronic) risks
- ~~compare~~ determine if there are seasonal diffs in conc. of LA in outdoor amb. air (chrysotile)

- heterogeneous vs. homogeneous ~~dis~~ distribution of LA conc. in ~~a~~ Libby Airshed



Ambient Air Sampling
Locations
Libby, Montana

Figure 4-1

CDM

Document: M:\2603-Volpe\Libby\GIS\Fig4-1_AmbientAirSmpling_060807.mxd

Section 5
Laboratory Analysis and Requirements

The laboratories used for all sample analysis will have participated in, and acceptably analyzed, the required parameters in the last two proficiency examinations from the National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program. The laboratory must also analyze performance evaluation samples when requested. These analyses must be performed before any samples are submitted to the laboratory to confirm the laboratory's capabilities and may be subsequently submitted at regular intervals. In addition, the laboratory must participate in the laboratory training program developed by the Libby laboratory team.

5.1 Analytical Methods

The ambient air and QA/QC samples will be submitted to a subcontracted laboratory for analysis using the International Organization for Standardization (ISO) transmission electron microscopy (TEM) method 10312, also known as ISO 10312:1995(E) (CDM 2005c) with project specific modifications LB-000016, LB-000019, LB-000028, LB-000029, LB-000029a, LB-000030 (CDM 2003).

Due to concerns related to the efficiency of sampling pumps over the required sampling time, 0.8 µm filters will be used instead of the traditional 0.45 µm called for when collecting samples for TEM analysis.

During the first month of sample collection, all field samples and the appropriate number of QA/QC samples will be submitted for analysis each week in order to determine if the samples being collected can be analyzed by the ISO TEM method to the required analytical sensitivity. The on-site laboratory will complete a preliminary analysis of 10 grid openings for each sample to ensure its readability by TEM. Completion of the sample analysis will be performed by an off-site laboratory. The on-site laboratory will ship the samples under proper COC to a laboratory designated by the Libby Project laboratory coordinator.

After the first month, all samples collected during the first week of each month will be sent for analysis to ensure sampling parameters are still producing samples that can meet the project requirements, and to provide preliminary data to EPA. The remaining samples will be archived and sent for analysis as directed by EPA.

All samples will be distributed to project laboratories as directed by the Libby Project laboratory coordinator. Archived samples will stored at project laboratories under COC until analysis is requested.

5.2 Reporting Limits

The reporting limit for ambient air required for this investigation is between 0.~~0001~~ and 0.00005 structures per cubic centimeter (S/cc).

5.3 Holding Times

No preservation requirements or holding times are established for air samples collected for asbestos analysis.

5.4 Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in the laboratory's QA management plan, which are approved by CDM as part of the laboratory procurement process. Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipping container and the individual samples. This inspection will include verifying sample integrity. The enclosed COC records will be cross-referenced with all of the samples in the shipment. The laboratory custodian will sign these records and provide copies for placement in the project files. The sample custodian may continue the COC record process by assigning a unique laboratory number to each sample on receipt. This number, if assigned, will identify the sample though all further handling at the laboratory. It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, and data reporting.

5.5 Documentation and Records

Data reports will be submitted to the CDM laboratory coordinator and include a case narrative that briefly describes the number of samples, the analyses, and any analytical difficulties or QA/QC issues associated with the submitted samples. The data report will also include signed COC forms, analytical data, a QC package, and raw data, where applicable. Raw data is to consist of instrument preparation logs, instrument printouts of field standards, and QC sample results, maintenance records, COC check in and tracking, raw data instrument print outs of sample results, analysis run logs, and sample preparation logs. All original data reports will be filed in the CDM project repository in Denver, Colorado. The laboratory also will provide an electronic copy of the data to the laboratory coordinator and others as directed by CDM.

5.6 Data Management

Sample results data will be delivered to the Volpe Center and CDM's Cambridge office both in hard copy and as an electronic data deliverable (EDD). Electronic copies of all project deliverables, including graphics, will be filed by project number. Electronic files will be routinely backed up and archived.

All results, field data sheet information, and survey forms will be maintained in the Libby project database managed by the Volpe Center.

Section 6
Assessment and Oversight

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that deviations from procedures are documented. These reports also serve to keep management current on field activities. Assessment, oversight reports, and response actions are discussed below.

6.1 Assessments

Performance assessments are quantitative checks on the quality of a measurement system and are appropriate to analytical work. Performance assessments for the laboratories may be accomplished by submitting reference material as blind reference (or performance evaluation) samples. These assessment samples are samples with known concentrations that are submitted to the laboratories without informing the laboratories that they are performance samples. Samples will be provided to the laboratories for performance assessment upon request from the EPA remedial project manager (RPM) or Volpe PM. Laboratory audits may be conducted upon request from the EPA RPM or Volpe PM.

System assessments are qualitative reviews of different aspects of project work to check on the use of appropriate QC measures and the functioning of the QA system. Project assessments will be performed under the direction of the QA managers, who reports directly to the CDM president. Quality Procedure 6.2, as defined in the CDM QA Manual (CDM 2005a), defines CDM 's corporate assessments, procedures, and requirements. Due to the amount of sampling and the duration of the Libby project, both a field audits and an office audit are scheduled for the site annually.

6. 2 Response Actions

Response actions will be implemented on a case-by-case basis to correct quality problems. Minor response actions taken in the field to immediately correct a quality problem will be documented in the applicable field logbook and a verbal report will be provided to the CDM PM. For verbal reports, the CDM PM will complete a communication log to document the response actions were relayed to him. Major response actions taken in the field will be approved by the CDM PM, the EPA RPM, and Volpe PM prior to implementation of the change. Major response actions are those that may affect the quality or objective of the investigation. Quality problems that cannot be corrected quickly through routine procedures may require implementation of a corrective action request (CAR) form.

All formal response actions will be submitted to either CDM 's QA manager and/or project QA coordinator for review and issuance. CDM 's PM or local QA coordinator will notify the QA manager when quality problems arise that may require a formal response action. CAR forms will be completed according to Quality Procedure 8.1 of the CDM QA Manual (CDM 2005a).

6.3 Reports to Management

QA reports will be provided to management whenever quality problems are

encountered. Field staff will note any quality problems on field data sheets, or in field logbooks. CDM 's PM will inform the project QA coordinator upon encountering quality issues that cannot be immediately corrected. Weekly reports and change request forms are not required for this work assignment. Monthly QA reports will be submitted to CDM 's QA manager by the project QA coordinator.

Topics to be summarized regularly may include but not be limited to:

- Document technical and QA reviews that have been conducted
- Activities and general program status
- Project meetings
- Corrective action activities
- Any unresolved problem
- Any significant QA/QC problems not included above

Section 7
Data Validation and Usability

Laboratory results will be reviewed for compliance with project objectives. Data validation and evaluation are discussed in Sections 7.1 and 7.2, respectively.

7.1 Data Review, Validation, and Verification Requirements

No formal data validation for these media is currently required of CDM. At the request of Volpe, CDM will validate data submitted by analytical laboratories. Data validation consists of examining the sample data package(s) against pre-determined standardized requirements. The validator may examine, as appropriate, the reported results, QC summaries, case narratives, COC information, raw data, initial and continuing instrument calibration, and other reported information to determine the accuracy and completeness of the data package. During this process, the validator will verify that the analytical methodologies were followed and QC requirements were met. The validator may recalculate selected analytical results to verify the accuracy of the reported information. Analytical results will then be qualified as necessary.

Data verification includes checking that results have been transferred correctly from laboratory data printouts to the laboratory report and to the EDD. Data verification for this project is primarily performed as a function of built-in quality control checks in the Libby project database when data is uploaded. However, the sample coordinator will notify the laboratories and the project database manager (Mr. Mark Raney, Volpe) of any discrepancies found during data usage.

7.2 Reconciliation with Data Quality Objectives

Once data has been generated, CDM evaluates data to determine if DQOs were achieved. This achievement will be discussed in the measurement report, including the data and any deviations to this SAP. Sample data will be maintained in a Microsoft Access database. Laboratory QC sample data will be stored in hard copy (in the project files) and in a separate database.

Section 8
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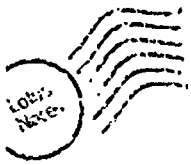
Add missing refs id'd in text.

Appendix A
CDM Technical Standard Operating Procedures and Site Specific Guidance Document

scale of observation will drive our sampling plan

*



Robert
Edgar/EPR/R8/USEPA/US
08/30/2006 01:22 PM

To Bonita Lavelle/EPR/R8/USEPA/US

cc Aubrey Miller/EPR/R8/USEPA/US@EPA, Mary Goldade/EPR/R8/USEPA/US@EPA, Paul Peronard/EPR/R8/USEPA/US@EPA, Wendy

bcc

Subject Re: Fw: Ambient Air QAPP

Bonnie, et.al,

My primary comment is that more emphasis needs to be given to the asbestos sampling methodology that is currently
buried in Appendix A. Particularly, the Site Sampling section, Section 7.4.2, in EPA's SOP#:2015 in which it describes that the
sampling cassette needs to point down so that the opening is perpendicular to the wind. Also, if a generator is used to provide power, it needs
to be located at least 10 ft. from the sampler. Our Libby SAP Section 4.3.1 describes how the sampler should be at least 15 ft from outer walls and the primary sampling height will be 6 ft. This section should also address the generic requirements for sampling addressed in the SOP#:2015. The individuals setting up the samplers need to follow the same procedures.

A few editiorial comments are as follows: Pg. 3-2 Section 3.3, second paragraph, last sentence: "The long term average value..." could be "The long term average concentration value...".

Section 3.4, Spacial Bounds, "The study will focus of data ...", should be "The study will focus on data...".

Pg. 3-3, second paragraph, "... well removed frm the Libby Site such from past or present releases..." should be reworded.

Temporal Bounds

"At present..." could be "At the present time..."

same paragraph, ""it is expected that the program will endure a minimum of 1 year..." could be "it is expected that the program will operate a minimum of 1 year".

Robert

WITH BONNIE'S WENDY'S MARY'S COMMENTS

Draft
Sampling and Analysis Plan for Outdoor Ambient Air Monitoring at the Libby Asbestos Site Libby, Montana

KEEP # OF SAMPLES AT 14

August 2006

Contract No. DTRS57-05-D-30109
Task Order No. 00006

FREQUENCY OF COLLECTION IN HALF

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NOTES ARE FROM MEETING W/ SRC 8/31/06

BONNIE
MARY
BILL B.
WENDY
ROBERT EDGAR

Draft
Sampling and Analysis Plan for Outdoor Ambient Air Monitoring at the Libby Asbestos Site Libby, Montana

August 2006

Contract No. DTRS57-05-D-30109
Task Order No. 00006

Approved by:_____ Date: _____
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Contents

Acronyms

BNSF	Burlington Northern Santa Fe
CAR	Corrective Action Request
CDM	CDM Federal Programs Corporation
COC	chain-of-custody
DQOs	data quality objectives
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FSDS	field sample data sheet
FSP	field sampling plan
HASP	health and safety plan
HQ	hazard quotient
ISO	International Organization for Standardization
KDC	Kootenai Development Corporation
LA	Libby amphibole
MCE	mixed cellulose ester
MET	meteorological
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
OU	operable unit
PCM	phase contrast microscopy
PLN	Poisson lognormal
PM	project manager
PPE	personal protective equipment
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RfC	cumulative reference concentration
RPM	remedial project manager
SAP	sampling and analysis plan
S/cc	structures per cubic centimeter
SOP	standard operating procedure
TEM	transmission electron microscopy
TWF	time weighted fraction
UCL	upper confidence limit
µm	micrometer
Volpe Center	John A. Volpe National Transportation Systems Center
%	percent

Deleted:

Section 1
Introduction

This document serves as the sampling and analysis plan (SAP) for an outdoor ambient air monitoring program to be initiated in September 2006 as part of the ongoing remedial investigation for the Libby Asbestos Site Operable Unit (OU) 4. This SAP outlines the sampling and analysis to be conducted by CDM Federal Programs Corporation (CDM) personnel during the collection of outdoor ambient air samples within the Libby Valley.

This SAP contains the elements required for both a field sampling plan (FSP) and quality assurance project plan (QAPP). This SAP has been developed in accordance with the *Environmental Protection Agency (EPA) Requirements for Quality Assurance Project Plans* (EPA 2001) and the *Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G4* (EPA 2006a).

The purpose of this SAP is to describe the sampling objectives, locations, measurement methods, and data quality objectives (DQOs) for the outdoor ambient air sampling program. The SAP is organized as follows:

Section 1 - Introduction
Section 2 – Site Background
Section 3 – Data Quality Objectives
Section 4 – Sampling Program, Rationale, and Locations
Section 5 – Laboratory Analysis and Requirements
Section 6 – Assessment and Oversight
Section 7 – Data Validation and Usability
Section 8 - References

Appendices

Appendix A – Standard Operating Procedures (SOPs)
Appendix B – Stationary Air Field Sample Data Sheet (FSDS)
Appendix C – Libby Asbestos Project Record of Deviation Form
Appendix D – Outdoor Ambient Air Sampling Program Daily Impact/Observation Memorandum

1.1 Objectives

This section defines objectives of the ambient air monitoring program and the intended use of the data.

As determined by previous investigations conducted at the Site, Libby amphibole (LA) is present in multiple environmental media in Libby including: indoor air, outdoor ambient air, indoor dust, vermiculite insulation, and soils. As a result, residents of Libby may be exposed to LA, and these exposures may pose a risk of cancer and/or non-cancer effects. One pathway that is of potential concern to EPA is A

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inhalation of LA in outdoor ambient air.

There are two objectives of the program. The first objective is to collect data of sufficient representativeness and quality to estimate the human health risks associated with inhalation of LA in outdoor ambient air in and around the town of Libby. Estimates of human health risks require the characterization of the long-term average concentrations of LA. The second objective is to collect data to determine the spatial and temporal trends of LA occurrence in outdoor ambient air within the study area at the Libby Superfund Site.

The specific activities detailed in this SAP will be used to implement and conduct a monitoring program for outdoor ambient air in the Libby Valley. Sampling will be conducted at a specified frequency from multiple locations chosen to provide spatial coverage of study area and taking outdoor wind patterns into account.

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1.2 Project Schedule and Deliverables

Sampling is expected to begin September 2006 and will continue on a regular schedule until the EPA risk assessment and management teams determine that the amount of data collected is sufficient to support final decision-making for this exposure pathway. Interim data reports summarizing all outdoor ambient air data collected to date will be generated no less than once every two months in order to keep project managers informed as to the data and findings.

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Section 2
Site Background

This section describes the site location, history, and information regarding previous outdoor ambient air data.

2.1 Site Location

The Libby Asbestos Site is located within Sections 3 and 10, Township 30 North (T30N), Range 31 West (R31W) of the Libby Quadrangle in Lincoln County, Montana (Figure 2-1). The Site includes homes and other businesses, which may have become contaminated with asbestos fibers as a result of the vermiculite mining and processing conducted in and around the City of Libby.

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2.2 Site History

Since 1999, the EPA has been conducting sampling and cleanup activities to address highly contaminated areas in the Libby Valley. The EPA investigation was initiated in response to media articles, which detailed extensive asbestos-related health problems in the Libby population. While at first the situation was thought to be limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities were affected.

The site was listed on the Superfund National Priorities List (NPL) in February 2002.

Deleted: EPA is conducting a baseline human health risk assessment for OU4.

For long-term management purposes, the Libby Asbestos Site has been divided into seven OUs:

- OU1. The former Export Plant is defined geographically by the property boundary of the parcel of land that included the former Export Plant.

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- OU2. The exact geographic area of OU2 has not yet been defined, but includes areas impacted by contamination released from the former Screening Plant. These areas include the former Screening Plant, the Flyway property, the Highway 37 Right of Way adjacent to the former Screening Plant and Rainy Creek Road, the Wise property, and the Kootenai Development Corporation (KDC) Bluffs. The KDC Bluffs area is located directly across the Kootenai River from the former Screening Plant.

- OU3. The mine OU includes a) the former vermiculite mine; b) the geographic area (including ponds) surrounding the former vermiculite mine that has been impacted by releases from the mine, including Rainy Creek and the Kootenai River; and c) releases along Rainy Creek Road. The exact geographic area of OU3 has not yet been defined but will be based primarily upon the extent of contamination associated with releases from the former vermiculite mine.

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- OU4. OU4 is defined as residential, commercial, industrial, and public properties, including schools and parks. OU4 includes highway corridors.

- OU5. The former Stimson Lumber Mill is defined geographically by the parcel of land that included the former Stimson Mill.

- OU6. The rail yard owned and operated by the Burlington Northern and Santa Fe Railroad (BNSF) is defined geographically by the BNSF property boundaries and extent of contamination associated with the rail yard. OU6 includes railroad transportation corridors.

- OU7. The Troy OU includes all residential, commercial, and public properties within the town of Troy.

EPA is conducting a baseline human health risk assessment for OU4. The baseline human health risk assessment will be incorporated into the remedial investigation and feasibility study for OU4. This outdoor ambient air monitoring plan is focused on collecting data to support the human health baseline risk assessment for OU4. Although outdoor ambient air in OU4 may be impacted by any activity that causes LA to be released from a source, it is currently believed that the main source of LA in outdoor ambient air in the vicinity of Libby is release from contaminated soil in and around the community. This is because contaminated soils occur in multiple locations in and around Libby, and because major waste piles and other obvious sources of LA are believed to have been removed from Libby. The remaining contaminated soils can serve as a continuous source of LA release into the air. Releases of LA from soil into outdoor ambient air may be due either to wind blowing over the soil, or from a variety of disturbances of the soil by human activities which occur randomly.

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2.3 Summary of Outdoor Ambient Air Monitoring in Libby

Beginning around 2000 and continuing through the year 2002, EPA collected outdoor ambient air samples at a number of locations around Libby in order to gain an initial understanding of the levels of LA typically observed in outdoor air. Locations where samples were collected included:

- Fitness Center at the City Hall Building (952 East Spruce Street)
- McGrade Elementary School (899 Farm to Market Road)
- Plummer Elementary School (247 Indian Head Road)
- Rainy Creek Road (various locations from intersection with Highway 37 to turnouts along the road to the mine summit)
- Lincoln County Courthouse Annex (418 Mineral Avenue)
- Lincoln County Landfill
- Station FA-1 (on the northwestern boundary of the River Runs Through It subdivision)
- Stimson Lumber Property

These samples were collected to support various removal and sampling programs. Details regarding sample collection procedures and analytical methods are described in the Summary of Asbestos Levels in Ambient Air in Libby, Montana report prepared by EPA (EPA 2006b). At some locations, air samples were collected over the

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entire three-year period. At other locations, air samples were collected for less than three years.

In addition, samples of outdoor ambient air were collected at 27 properties in Libby where EPA clean-up activities were scheduled. These samples were collected before clean-up began, and the measurements were intended to help determine if the clean-up activities caused a measurable release to outdoor ambient air. These samples were collected and analyzed in accordance with the Draft Final Response Action Work Plan (CDM 2003a). The duration of sampling at these individual properties was limited to one to two days.

The results of these samples were evaluated in the Summary of Asbestos Levels in Ambient Air in Libby, Montana report (EPA 2006b). The conclusions of this report were as follows:

- The presence of LA fibers was identified in outdoor ambient air samples collected around the Libby community.
- Sources of the LA fibers found in outdoor ambient air in Libby are not known with certainty, but it seems likely that windborne transport of fibers present in soils and dust around the community is one important component.
- Concentration levels do not appear to be substantially different at different locations within the main residential-commercial section of Libby, but may be higher closer to the mine.
- Current data are too limited to determine if any time trend towards reduced levels in outdoor ambient air is occurring as a result of on-going EPA clean-up activities, but collection of additional current and future outdoor ambient air data will help answer this question.

The conclusions of the ambient air summary report are limited by the following:

- Data presented in the report are incomplete because of lack of seasonal and geographic representation over time, and there are an insufficient number of data points at adequate sensitivity.
- The preliminary analyses presented assume that "non-detect" values are equal to zero. USEPA Region 8 is currently reviewing this approach for analyzing "non-detect" results.
- The methodology for estimating risk ranges is preliminary and should be considered draft.
- Evaluation of risk in the document is limited to a single pathway and does not address cumulative exposure from multiple pathways at the Site.

EPA identified the need for further investigations of outdoor ambient air in Libby and its vicinity, specifically: collection of additional outdoor ambient air data; refinement of the methodology for estimating human health risk ranges for the Libby population; and consideration of cumulative exposures in evaluating risk.

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Section 3
Data Quality Objectives

The DQO process, based on scientific methods, is a series of planning steps that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop site-specific DQOs (EPA 2006a). These guidelines were followed for the development of the DQOs presented in this section.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps; output from each step influences the choices that will be made later in the process. These steps include:

1. State the problem
2. Identify the decision
3. Identify the inputs to the decision
4. Define the study boundaries
5. Develop a decision rule
6. Specify tolerable limits on decision errors
7. Optimize the design

3.1 Step 1 - State the Problem

The purpose of this step is to describe the problem to be studied so that the focus of the investigation will be unambiguous.

As determined by previous investigations conducted at the Site, LA is present in multiple environmental media in Libby including: indoor air, outdoor ambient air, indoor dust, vermiculite insulation, and soils. As a result, residents of Libby may be exposed to LA, and these exposures may pose a risk of cancer and/or non-cancer effects. One pathway that is of potential concern to EPA is inhalation of LA in outdoor ambient air. However, as noted above (see Section 2.3), the current data set for LA concentrations in outdoor ambient air in Libby is not extensive enough to support risk assessment calculations for this exposure pathway with acceptable levels of confidence because the data may not be fully representative over geographic area and/or time, and because many of the data have a high (poor) analytical sensitivity, which tends to limit confidence in estimates of long-term average exposure levels.

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3.2 Step 2 - Identify the Decision

This step identifies what questions the investigation will attempt to resolve and what actions may result.

The decision that EPA is seeking to make is whether the levels of LA in outdoor ambient air contribute a risk of cancer or non-cancer effects, either alone or in combination with other exposure pathways, that is within an acceptable range of risks under a reasonable maximum exposure scenario. The risk assessment will support EPA's decisions about whether additional clean-up actions (over and above those already occurring in Libby) are needed to reduce or eliminate sources of LA contamination in Libby that contribute to outdoor ambient air.

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3.3 Step 3 - Identify the Inputs to the Decision

The purpose of this step is to identify the environmental data that need to be obtained and the measurements that need to be taken to resolve the decision statements.

The key environmental data required to estimate cancer and non-cancer risks from exposure to outdoor ambient air are reliable and representative (over space and time) data on the long-term average concentration of LA in outdoor ambient air within an exposure unit at the Site. These data may then be analyzed using appropriate statistical methods to determine if there are important spatial patterns (i.e., significant differences between sub-areas) or important time trends in the data (e.g., significant differences between summer and winter, a decreasing time trend as cleanup activities continue, etc.). Based on these analyses, the data may then be grouped into appropriate geographical and temporal data sets, from which long-term average values may be calculated. The long-term average value for a specified area and time frame is the key determinant of the cancer and non-cancer risk to residents and workers exposed in that area and time. If the data indicate that there are no significant differences in the concentration of LA in outdoor ambient air samples between sub-areas, the entire study area will be considered one exposure unit and all data will be used to calculate the long-term average. If, however, there are significant differences between sub-areas, the sub-areas may be considered separate exposure units.

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In this regard, it is important to recognize that there are several alternative strategies for specifying the concentration of asbestos in air and in using those data to estimate exposure and risk. At present, final decisions have not been made regarding which approach(es) will be used, so it is important that the data obtained provide full details on the particle size (length, width, mineral type) of all asbestos structures observed, so that these data can be used to compute the appropriate concentration values for use in whatever alternative risk models may be selected for use at the Site.

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3.4 Step 4 - Define the Boundaries of the Study

This step specifies the spatial and temporal boundaries of this investigation.

Spatial Bounds

The study will focus on collection of data from OU4 that are representative of the main residential-commercial area of the Libby Valley. This area is indicated in Figure 3-1. This area is selected as the focus of this program because this is where the

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majority of area residents and workers live and work and, therefore, are most likely to be exposed to outdoor ambient air. Levels of LA in outdoor ambient air in other parts of OU4 as well as locations associated with other Operable Units (e.g., the mine, Rainy Creek Road, Stimson Lumber, the former Screening Plant, Export Plant and other former processing facilities, the community of Troy, etc.) will be investigated under separate sampling designs, as necessary.

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Based on the data available to date, no clear differences are apparent in average LA concentrations in different sub-locations in the main residential commercial area of Libby (identified as Zones 1, 2 and 3 in the ambient air summary report [EPA 2006b]). Therefore, it may be appropriate to consider the main residential-commercial area of the Libby Valley as one exposure unit and to calculate the long-term average concentration of LA in outdoor ambient air by combining all the data. However, if the new data reveal important spatial variations in long-term average outdoor ambient air levels, then it may be appropriate to subdivide the main area of Libby into two or more sub-areas, each of which would be considered separate exposure units and would be evaluated separately for this pathway.

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In addition to samples in the main residential-commercial parts of Libby, samples will also be collected at several stations that are well removed from the Libby Site such that impact from past or present releases of LA are not expected to be of concern. Data from these stations will be used to assess the magnitude of Site-related releases to outdoor ambient air.

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Temporal Bounds

The program will begin in September 2006. At present, the duration of the monitoring program cannot be stated with certainty, since the magnitude of temporal variability (by day, by season, by year) is not yet known. Further, the magnitude of any effect of on-going clean-up actions on outdoor ambient air levels is not known. However, in order to ensure that temporal variability on the scale of days and months is adequately captured in the data set, it is expected that the program will endure a minimum of 1 year. If it is determined that there is a need to capture additional data to improve the temporal representativeness of the data set and/or to collect data that will allow an assessment of long-term trends that may be resulting from on-going cleanup activities, then it is expected that the program would be extended for several additional years. These decisions will be made by the risk managers once the initial year of data are (is?) collected, and after consultation with EPA's scientific support team at the Site.

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3.5 Step 5 - Develop Decision Rules

The purpose of this step is to describe the method that EPA will use to make final risk management decisions from the data.

At present, risk management decision rules for the Site have not yet been defined. Because outdoor ambient air is only one of several exposure pathways that will be evaluated as part of the baseline human health risk assessment, it is expected that the decision rule for outdoor ambient air will take the form that the residual cancer and non-cancer risk associated with the reasonable maximum exposure scenario

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contributed by this pathway may not exceed some specified level (either an absolute level or alternatively, some proportion of the total risk).

In the absence of a quantitative decision rule, it is tentatively assumed for the purposes of planning the monitoring program that risks associated with inhalation of outdoor ambient air under reasonable maximum exposure conditions will be considered to be within an acceptable range if the cancer risks are between 1E-06 and 1E-04 (between 1 in a million and 1 in ten thousand) and/or if the non-cancer hazard quotient (HQ) is less than 1. This assumption is for planning purposes and should not be interpreted as a risk management decision since final risk management decisions will consider the cumulative risk of exposure to multiple exposure pathways. This assumption is used only to support initial efforts to plan the monitoring program.

3.6 Step 6 - Specify Tolerable Limits on Decision Errors

The tolerable limits on decision errors, used to establish performance goals for the data collection design, are specified in this step.

In making risk management decisions with calculated estimates of exposure and risk, two types of decision errors are possible:

- A Type I (false negative) decision error would occur if a risk manager decides that exposure to outdoor ambient air is not of significant health concern, when in fact it is of concern.

- A Type II (false positive) decision error would occur if a risk manager decides that exposure to outdoor ambient air is above a level of concern, when in fact it is not.

EPA is most concerned about guarding against the occurrence of Type I errors, since an error of this type may leave humans exposed to unacceptable levels of LA in outdoor ambient air. For this reason, it is anticipated that exposure assessment for this pathway will be based on the best estimate and the 95% upper confidence limit (UCL) of the long-term average concentration of LA in the area being evaluated. Use of the UCL to estimate exposure and risk helps account for limitations in the data, and provides a margin of safety in the risk calculations, ensuring that risk estimates are unlikely to be too low.

EPA is also concerned with the probability of making Type II (false positive) decision errors. Although this type of decision error does not result in unacceptable human exposure, it may result in unnecessary expenditure of resources. For the purposes of this effort, the strategy adopted for controlling Type II errors is to ensure that if the risk estimate based on the 95% UCL is above EPA's level of concern for this pathway, then the UCL is not larger than 3-times the best estimate of the mean. If the 95% UCL is greater than 3 times the best estimate of the mean, then more data are needed.

3.7 Step 7 - Optimize the Design for Obtaining Data

This step identifies a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

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Estimating the Number of Samples Required

The method used to compute the UCL of a set of outdoor ambient air samples depends on the statistical properties of the data set. Analysis of data available to date indicates that the variability between outdoor ambient air samples may be approximated by a mixed Poisson lognormal (PLN) distribution. Statistical procedures are available to estimate the parameters of the underlying lognormal distribution (Haas et al. 1999), and these fitted parameters may be used to compute the UCL of the mean using the approach for lognormal data sets described in EPA 1992a. Based on this approach, the ratio of the UCL to the mean of a data set (an indication of the statistical uncertainty in the data) is given by

$$\frac{UCL}{Mean} = \exp[\sigma H / \sqrt{(n-1)}]$$

where:

σ = log standard deviation of the measured values
H = statistic described in USEPA (1992)
n = number of samples

Based on available data, a rough approximation for σ for outdoor ambient air samples from the main part of Libby is 1.9. This was calculated using data from Zones 1-3 identified in the ambient air summary report (EPA 2006b). Based on this rough estimate and assuming that the study area will be considered as one exposure unit, the ratio of the UCL to the mean as a function of n is expected to be approximately as shown in Figure 3-2. As seen, the ratio (a measure of uncertainty) approaches a value of about 2 as the number of samples approaches about 80-100, and continues to decline slowly as the number of samples increases.

Based on this analysis, it is expected that if a total of about 80-100 samples per exposure area were collected, the uncertainty in exposure estimates would be limited to about a factor of two, and that additional numbers of samples would be unlikely to result in a substantial decrease in uncertainty.

If resulting data (collected over a year's time) support the assumption that the entire study area represents a single exposure unit, then ample data will be collected – well beyond the required 80-100 data points per exposure unit area. However, for study planning purposes, such an assumption cannot be made *a priori*. If it is assumed that each sample location represents a separate exposure unit, approximately 72 samples will be collected at each location – nearly enough to support the study DQOs on their own. The data will be periodically evaluated to determine whether the sample variability supports application of one or more exposure units within the study area and/or whether continuance of the outdoor ambient air monitoring is warranted.

Estimating the Required Analytical Sensitivity

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Based on this, it is expected that if a total of about 80-100 samples per exposure area were collected, the uncertainty in exposure estimates would be limited to about a factor of two, and that additional numbers of samples would be unlikely to result in a substantial decrease in uncertainty.

In general, it is desirable that the analytical sensitivity for a set of samples be such that the contaminant would be detected and quantified with confidence if it were present at a level of potential health concern:

Target Analytical Sensitivity ≤ Level of Concern

As noted above, for the purposes of this planning document, it is assumed that the level of cancer concern for outdoor ambient air is ≤ 1E-05 (1 in 100,000), and the level of concern for non-cancer effects is an HQ ≤ 0.1.

Comment [MSOffice4]: This needs to be consistent with what's written in previous sections and is currently not.

For cancer, a simplified equation for computing the risk associated with some specified concentration is:

Risk = C · TWF · UR

where:

Risk = risk of lung cancer or mesothelioma from the exposure being evaluated
C = long-term average concentration of asbestos (structures per cubic centimeter [s/cc])
TWF = time weighting factor (percent of full time that exposure occurs)
UR = unit risk for lifetime exposure

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To find the level of concern associated with a cancer risk of 1E-05, the equation is rearranged and solved as follows:

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Level of Concern ≤ 1E-05 / (TWF · UR)

For planning purposes, it is conservatively assumed that the TWF is 1.0. This corresponds to exposure to outdoor ambient air that occurs 24 hrs/day for a lifetime (*actual exposures are likely to be lower than this for most people*). Based on EPA's currently recommended risk model (IRIS 2006), the unit risk factor for lifetime exposure is 0.23. Thus, the level of concern for LA in air would be about:

Level of Concern ≤ 1E-05 / 0.23 = 0.00004 PCM s/cc

where:

PCM = phase contrast microscopy

For non-cancer effects, the basic risk equation is:

HQ = C · (ET/24 · EF/365 · ED) / RfC

where:

HQ = hazard quotient (dimensionless)
C = long-term average concentration of asbestos in air (f/cc)
ET = exposure time (hrs/day)
EF = exposure frequency (days/yr)
ED = exposure duration (yrs)

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RfC = Cumulative Reference concentration (f/cc-yrs)

However, at present, no RfC has been established for evaluating non-cancer effects from inhalation of LA, so it is not yet possible to compute an analogous level of concern for this endpoint. In the absence of data, it is tentatively assumed that the level of concern that is adequate for evaluating cancer risk will also be sufficient for evaluating non-cancer risks. This assumption will be re-visited when an RfC is developed.

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Thus, the target analytical sensitivity for outdoor ambient air samples should be ≤ 0.00004 cc^{-1}.

Refinements to the Design as Data are Collected

In accord with EPA's DQO process, it is expected that the outdoor ambient air monitoring program described in this document may be modified periodically as data are obtained. For example, if data suggest that the variability in concentrations over time is low, then EPA may decrease the number of samples collected over a specified period of time. Alternatively, if data suggest that the variability in concentrations over geographic areas is higher than expected, then additional sampling stations may be added to better characterize the spatial variability. Similarly, the target analytical sensitivity may be either increased or decreased, depending on the detection frequency and mean values observed in initial samples results, and on the RfC value when it becomes available.

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Section 4
Sampling Program

This section provides brief summaries of SOPs and additional site-specific detail that may not be discussed in the SOPs. The site-specific procedure will be followed during this investigation. For additional information, field personnel will refer to the SOPs included in Appendix A. The site health and safety plan (HASP) should be consulted to determine health and safety protocols for performing site work. The SOPs and site-specific procedures included in Appendix A are listed below (CDM 2005b):

- Sample Custody (SOP 1-2)
- Packaging and Shipping of Environmental Samples (SOP 2-1)
- Guide to Handling of Investigation-Derived Waste (Modified SOP 2-2)
- Field Logbook Content and Control (SOP 4-1)
- Photographic Documentation of Field Activities (Modified SOP 4-2)
- Control of Measurement and Test Equipment (SOP 5-1)
- Insert new Air Sampling SOP title and number here

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The following sections are a summary of field activities that will be performed in accordance with this SAP by CDM during the outdoor ambient air sampling investigation.

4.1 Pre-Sampling Activities

Prior to beginning field activities, a field planning meeting will be conducted and an inventory of supplies will be performed to determine procurements needs. The following sections discuss these pre-sampling activities.

4.1.1 Field Planning Meeting

Prior to beginning field activities, a field planning meeting will be conducted by the CDM project manager (PM) and attended by the field staff and a member of the CDM quality assurance (QA) staff as well as EPA support scientists who were instrumental in study design development. The EPA Remedial Project Manger will be notified of the date and time of the meeting. The agenda will be reviewed and approved by the QA staff and the health and safety officer prior to the meeting. The meeting will briefly discuss and clarify:

- Objectives and scope of the fieldwork
- Equipment and training needs
- Field operating procedures, schedules of events, and individual assignments

- Required quality control (QC) measures
- Health and safety requirements
- Documents governing fieldwork that must be on site
- Any changes in the field plan documents

A written agenda, reviewed by the CDM QA staff, will be distributed and an attendance list signed. Copies of these documents are maintained in the project files, in the CDM Denver office. Additional meetings will be held when the documents governing fieldwork require it or when the scope of the assignment changes significantly.

The field team personnel will perform the following activities before and during field activities, as applicable:

- Review and understand this SAP and HASP
- Ensure that all sample analyses are scheduled through the laboratory
- Obtain required sample containers and other supplies
- Obtain and check field sampling equipment
- Obtain personal protective equipment (PPE)

4.1.2 Inventory and Procurement of Equipment and Supplies

The following equipment will be required for sampling activities, and any required equipment not already contained in the field equipment supply inventory will be procured prior to initiation of sampling activities:

- Field logbooks
- Indelible ink pens
- Digital camera
- Sample media: 0.8 micrometer (µm) pore size, 25-millimeter diameter mixed cellulose ester (MCE) filter cassettes.
- Sample paperwork and sample tags/labels
- Custody seals
- Zipper-top baggies
- Air sampling equipment as described in EPA SOP 2015
- PPE as required by the HASP

4.1.3 Community Coordination

Prior to the implementation of the sampling events described in this SAP, the owner of each property where sampling is proposed will be contacted to determine his/her desire to participate in this investigation. The property owner will be advised of the study's duration (at least a year and perhaps longer) and will be informed of the importance of obtaining samples consistently over that extended time period. Access agreements will be obtained as required. A community involvement coordinator will contact each resident to describe the program and the potential impact to the resident (e.g., sample technicians visiting the property at regular intervals, the expected duration of the program). Each residential or commercial property participating in this investigation will be reimbursed for power used from their service to run sampling equipment.

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4.2 Field Documentation

Field documentation to be generated during this sampling study includes the following: logbooks, FSDSs, photographs, and sample custody documentation. The following sections describe the types of documentation as well as how field documents will be corrected if errors occur and the process for documenting deviations from field procedures prescribed in this SAP.

4.2.1 Field Logbooks and Records

Field logbooks will be maintained in accordance with CDM SOP 4-1, Field Logbook Content and Control (Appendix A). This log is an accounting of activities at the Site and will note problems or deviations from the governing plans and observations relating to the sampling and analysis program. Field administrative staff will manage the logbooks and FSDS and will send original field logbooks, as they are completed, to the CDM project file repository in Denver, Colorado for document control. A copy of each logbook will be maintained in the CDM office in Libby, Montana.

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Detailed sampling notes will be recorded for each sample on an FSDS (Appendix B). Field administrative staff will manage the FSDSs and will send copies to the CDM project file repository in Denver, Colorado for document control and a copy to the John A. Volpe National Transportation Systems Center (Volpe Center) for data entry required in the project database. Original FSDSs will be maintained in the CDM office in Libby, Montana.

For each day that outdoor ambient air samples are collected in association with this SAP, a Daily Impact/Observation Memorandum will be completed. An example of this memorandum is included in Appendix D. The purpose of this memorandum is to capture, in an easy to access format, any actions or issues that could affect the results or viability of an outdoor ambient air sample.

4.2.2 Photographic Documentation

Photographic documentation will be recorded for each sampling location (at first collection event) and at any place the field sampling personnel determine necessary with a digital camera in accordance with CDM SOP 4-2, Photographic Documentation of Field Activities (Appendix A) with the following site-specific modifications.

Section 5.2.2, General Guidelines for Still Photography – A slate is not required for

each new roll of film. The information for the slate will be recorded in the field logbook (e.g., direction of the photograph, surrounding landmarks, etc.). All team members, as stated in the logbook, will be photographers and witnesses at the locations. Slates are not required for close-up photographs, and instead the required information can be listed in the digital photograph file name. File names will be in the format: last name of property owner_address_AAS_date, where:
AAS = Ambient Air Sampling
Date = MM/DD/YY

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A color strip is not required for close-up or feature photographs.

Section 5.2.4, Photographic Documentation - The name of the laboratory, time and date of drop-off, and receipt of film are not required to be recorded for this project.

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Section 3.3.2, Archive Procedures - Digital photographs will be archived on the CDM Libby Server (secure) with nightly backup. These files will be archived until project closeout, at which point project management will determine a long-term electronic file storage system.

4.2.3 Sample Labeling and Identification

Samples will be labeled with index identification numbers supplied by field administrative staff, and will be signed out by the sampling teams (i.e., controlled). One sample label will be placed on the sampling cassette. The sample identification number will also be written on the outside of the plastic bag used to hold the sampling cassette during transport.

Sample index identification numbers will identify the samples collected during the outdoor ambient air study by having the following format:

AA-#####

Where: AA = Ambient air
= a sequential five digit number

4.2.4 Field Sample Custody and Documentation

Sample custody and documentation will follow the requirements specified in CDM SOP 1-2, Sample Custody (Appendix A). All samples and sampling paper work will be relinquished to the sample coordinator at the end of each day. Field administrative staff will be responsible for management of all field forms.

4.2.5 Corrections to and Deviations from Documentation

Logbook modification requirements are described in CDM SOP 4-1, Field Logbook Content and Control (Appendix A). For the logbooks, a single strikeout initial and date is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. These procedures will also be followed for the correction of any field form. All deviations from the guiding documents will be recorded on the Daily Impact/Observation Memorandum (Appendix D) and the Libby Asbestos Project Record of Modification Form

(Appendix C). Any major deviations will be documented according to the CDM quality management plan (CDM 2005a).

4.3 Outdoor Ambient Air Sampling

The following sections describe the process of selection of outdoor ambient air sampling locations, the procedures for sample collection, and requirements for collection and submission of QA/QC samples.

4.3.1 Selection of Outdoor Ambient Air Sampling Locations

Outdoor ambient air sampling will be conducted at 14 specified locations in the main residential/commercial area of Libby (Figure 4-1). These sampling locations were selected based on prevailing northeast to southwest wind directions in the Libby Valley and year-round accessibility; they were distributed across the area to ensure adequate spatial coverage.

Outdoor ambient air sampling pumps will be placed on the east or west side of buildings approximately 15 feet away from outer walls to reduce building interference with wind patterns and allow the samples to be exposed to the dominant northwest to southeast air patterns in the valley. Sample locations should be chosen so that particulates generated by automobile traffic on dirt and gravel roads will be minimized.

All samples will be collected from the height of an adult's breathing zone, approximately 6 feet above ground level by using lengths of tygon tubing that reach from the sampling pump positioned near the ground to a sampling stand designed to hold the sampling media at desired heights. During the first two weeks of the sampling program, samples will also be collected at both 6 feet above ground level and 3 feet above ground level at the following 6 sampling locations:

- 1915 Kootenai River Road
- 1593 Highway 2 W
- 60 Port Blvd
- Cabinet View Golf Course
- 475 Fish Hatchery Road
- 122 Evans Rd

After these data are collected, the paired samples (3 ft vs. 6 ft) will be compared statistically to determine if there are any meaningful differences, and this information will be used to determine whether continued sampling at both 3 feet and 6 feet is required.

In addition to the 14 outdoor ambient air sampling locations shown in Figure 4-1, two background samples will be collected; in Eureka and Helena, Montana. Eureka was chosen because it is a location known to have buildings with vermiculite attic insulation. The Eureka sample will be collected at the city office building located at 108 Dewey Avenue. The Helena sample will be collected at the local CDM office located at 50 West 14th Street. Due to the remote location of the Eureka sampling location (70 miles north-northeast of Libby), this sample will be collected over a 32-

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hour period once a week (flow rates of 8 and 5 liters/minute). This will yield a sample volume that is similar to the volumes that will be collected in Libby. Both background locations will only be collected from a height of 6 feet.

Comment [E7]: Explain the 2 flow rates, are 2 monitoring stations placed at each of the 2 background locations? If so, this is great, but clarify in the text. If not, we should discuss intent here.

Meteorological (MET) data will also be collected in the study area and for the background locations. MET data will include the following parameters: temperature, wind direction, wind speed, relative humidity, barometric pressure, and precipitation. Data will be captured on a data logger that will be set to record readings every 15 minutes. Information will be downloaded from each data logger weekly. Three MET stations will be placed in the study area at the following locations (Figure 4-1):

Comment [R8]: What is the height of the stations

- 2425 Highway 2 West
- 60 Port Blvd
- 475 Fish Hatchery Road

In addition, MET station data will be downloaded daily from the internet for the following weather stations as reported hourly by the National Oceanic and Atmospheric Administration (NOAA):

- Libby Fire Cache (NOAA station identification = LBBM8)
- Eureka (NOAA station identification = EURM8)
- Helena Regional Airport (NOAA station identification = KHLN)

4.3.2 Collection of Outdoor Ambient Air Samples

As noted above, the full duration of the monitoring program can not be specified with certainty at this time, but it is expected that the program will last for at least 1 year, and may extend beyond that point. This will result in the collection of a minimum of 1,241 additional outdoor ambient air samples. This number is expected to provide a good characterization of both geo-spatial and temporal variability, but effects of variability will be assessed as described in Section 3.7, above. For example, if three sub-areas were delineated as exposure areas for use in the risk assessment, there would be about 4-5 stations in each area, the number of samples from each area would be about 300 per year, which is expected to yield data of sufficient quantity and quality to provide reliable estimates of the mean and the UCL of the mean of the long-term average concentration (see Section 3.7, above).

Comment [R9]: I get 1186. please clarify how this was calculated for the sake of transparency.

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Outdoor ambient air samples will be collected and equipment calibrated in accordance with EPA SOP 2015 (Appendix A) for asbestos sampling. The samples will be collected using high flow air pumps and 25-millimeter diameter, 0.8µm pore size MCE filter cassettes.

The target volume of air to be sampled will initially be 14,000 liters over 5 days, or 120 hours, at a flow rate of approximately 2 liters per minute. As samples are initially collected during this program and analyzed, the flow rate and sample time may be adjusted to ensure the sample filter has proper loading for the required analytical analysis and sensitivity goals.

To further ensure the collection of viable samples, an additional sample will be

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collected at each sampling location with a flow rate of 1.5 liters per minute over the same period of time. The sample collected at 1.5 liters per minute will initially be archived. Analysis of the sample collected at the lower flow rate will occur if the sample collected at the higher flow rate is not able to be analyzed by the required method due to overloading on the sample filter.

To ensure that temporal representation is achieved, samples will be collected on a staggered schedule throughout this investigation. Table 4-1 shows an example of the staggered schedule for the first month of the investigation. The schedule presented in Table 4-1 is only intended to provide an example for execution, and specific start dates for each sample location may be adjusted.

Sample collection will begin over a 3 to 4 hour period on a predetermined day of the week. During the first two weeks of the sampling event, every sample will be checked every 3 to 4 hours, after that each sample cassette will be checked every 6 to 8 hours for visible loading. If visible loading is observed on a filter, the collection of that sample will be concluded, duration of collection will be noted, and the sample submitted for analysis. Samples will not be submitted on more than one cassette if visible loading is observed, instead the analysis of the sample will be modified (more grid openings counted) to ensure the appropriate analytical sensitivity is reached.

Comment [E11]: Please discuss w/ Mary to ensure she understands the intent here.

Sampling may be suspended if adverse weather conditions exist (e.g., precipitation that could interfere with sample viability and/or equipment function, hazardous winter road conditions). If this occurs, the EPA RPM will be notified immediately.

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AND FLOW RATE

IF FLOW RATE HAS GONE DOWN DUE TO VISIBLE LOADING OF THE FILTER,

4.3.3 Chain-of-Custody Requirements

Chain-of custody (COC) procedures will follow the requirements as stated in CDM SOP 1-2, Sample Custody with modification (Appendix A). The COC record is used as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A complete COC record is required to accompany each shipment of samples.

At the end of each day, all samples will be relinquished to the sample coordinator by the sampling team following COC procedures. The sample coordinator will follow COC procedures to ensure proper sample custody between acceptance of the sample from the field teams to shipment to the laboratory.

4.3.4 Sample Packaging and Shipping

Samples will be packaged and shipped in accordance with CDM SOP 2-1, Packaging and Shipping of Environmental Samples, with modification (Appendix A). A custody seal will be placed so that both ends of the sampling cassette are covered by the seal. If an overnight delivery service is used to ship the samples, the samples will be secured for shipment in a rigid container with sufficient packing material to prevent dislodging the collected fibers. Vermiculite, shredded paper, or expanded polystyrene cannot be used as packing material. Plastic bubble wrap is an example of an acceptable packing material.

4.4 Equipment Decontamination

Sampling will be completed with dedicated field equipment, and equipment decontamination will not be required for the activities described in this SAP.

4.5 Handling Investigation Derived Waste

Any disposable equipment or other investigation derived wastes will be handled in accordance with CDM SOP 2-2 with Site-specific modifications, Guide to Handling of Investigation-Derived Waste (Appendix A).

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4.6 QA/QC Activities

This section describes the QA/QC activities that will be conducted to ensure samples collected during this effort are of sufficient quality to meet the project DQOs.

4.6.1 Calibration and Control of Sampling Equipment

Prior to the collection of samples, sampling pumps will be calibrated to the required flow rate by use of an adequately maintained secondary calibration standard according to CDM SOP 5-1, Control of Measurement and Test Equipment (Appendix A) and EPA SOP 2015 (Appendix A).

MET stations will be maintained in accordance with the manufacturer's instructions.

4.6.2 Collection of QA/QC Field Samples

Three types of QA/QC samples will be collected as part of this investigation: lot blanks, field blanks, and co-located samples.

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Lot blanks - Before samples are collected, two cassette lot blanks from each filter lot of 100 cassettes will be randomly selected and submitted for analysis. The lot blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. The entire batch of cassettes will be rejected if any asbestos fiber is detected on the lot blanks.

Field blanks - One field blank will be collected each day and one analyzed per week for this sampling study, as described in field modification LFO-000064. If asbestos fibers are observed on a field blank, other field blanks collected during that week will be submitted for analysis to determine the potential impact on sample results. The field blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. The blanks will be collected at varying locations throughout the week (one collected at a different location on each day of the week).

Co-located samples - Co-located samples are used to determine the variability of the measured parameter. Due to the nature of outdoor ambient air, these samples should not be used to assess error (EPA 1992b). Co-located samples will be collected at a frequency of one per week. Field co-located samples will be collected beside a field sample and given a unique index identification number. Field co-located samples should be collected from varying locations throughout the study area. The sampler will assign the same location ID to the co-located sample as the field sample, and will record the identification number of the field sample on the FSDS in the comments

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section. Co-located samples will be sent for analysis by the same method as field samples.

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Section 5
Laboratory Analysis and Requirements

The laboratories used for all sample analysis will have participated in, and acceptably analyzed, the required parameters in the last two proficiency examinations from the National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program. The laboratory must also analyze performance evaluation samples when requested. These analyses must be performed before any samples are submitted to the laboratory to confirm the laboratory's capabilities and may be subsequently submitted at regular intervals. In addition, the laboratory must participate in the laboratory training program developed by the Libby laboratory team.

5.1 Analytical Methods

The outdoor ambient air and QA/QC samples will be submitted to a subcontracted laboratory for analysis using the International Organization for Standardization (ISO) transmission electron microscopy (TEM) method 10312, also known as ISO 10312:1995(E) (CDM 2005c) with project specific modifications LB-000016, LB-000019, LB-000028, LB-000029, LB-000029a, LB-000030 (CDM 2003b). All structures having length greater than or equal to 0.5 and an aspect ratio of 3:1 will be recorded on the Libby site-specific laboratory data sheets and electronic deliverables.

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As stated in LB-000029 and LB-000029a, the frequency for laboratory-based QC samples for TEM analysis is:

Lab blank = 4%
Recount same = 1%
Recount different = 2.5%
Reprep = 1%
Verified analysis = 1%
Interlab = 0.5%

Due to concerns related to the efficiency of sampling pumps over the required sampling time, 0.8 µm filters will be used instead of the traditional 0.45 µm called for when collecting samples for TEM analysis. In addition, the use of 0.8 µm filters will help reduce loading concerns typically encountered when collecting samples of long duration and high volume. Historical ambient air samples at the site were also collected on 0.8 µm filters; by using these filters for this sampling program, data comparability will be improved.

During the first month of sample collection, all field samples collected at the higher flow rate and the appropriate number of QA/QC samples will be submitted for analysis each week in order to determine if the samples being collected can be analyzed by the ISO TEM method to the required analytical sensitivity. The on-Site laboratory will complete a preliminary analysis of 10 grid openings for each sample to ensure its readability by TEM. Completion of the sample analysis will be performed by an off-Site laboratory. The on-Site laboratory will ship the samples under proper COC to a laboratory designated by the Libby Project laboratory coordinator.

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After the first month, all samples collected at the higher flow rate during the first week of each month will be sent for analysis to ensure sampling parameters are still producing samples that can meet the project requirements, and to provide preliminary data to EPA.

Sample Archival

All samples not planned for immediate analysis will be archived (where??) and sent for analysis only if directed by EPA.

All samples planned for immediate analysis will be distributed to project laboratories as directed by the Libby Project laboratory coordinator. Once analyzed, all samples will be will stored (archived) at project laboratories under COC until further notice.

5.2 Analytical Sensitivity

The target analytical sensitivity for outdoor ambient air for this investigation is 0.00004 s/cc. In the event of sample loading or other issues where a sensitivity of 0.00004 s/cc can not be achieved, the laboratory may report a sample result with a higher (poorer) sensitivity *only after consultation with EPA project personnel.*

5.3 Holding Times

No preservation requirements or holding times are established for air samples collected for asbestos analysis.

5.4 Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in the laboratory's QA management plan, which are approved by CDM as part of the laboratory procurement process. Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipping container and the individual samples. This inspection will include verifying sample integrity. The enclosed COC records will be cross-referenced with all of the samples in the shipment. The laboratory custodian will sign these records and provide copies for placement in the project files. The sample custodian may continue the COC record process by assigning a unique laboratory number to each sample on receipt. This number, if assigned, will identify the sample though all further handling at the laboratory. It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, and data reporting.

5.5 Documentation and Records

Data reports will be submitted to the CDM laboratory coordinator and include a case narrative that briefly describes the number of samples, the analyses, and any analytical difficulties or QA/QC issues associated with the submitted samples. The data report will also include signed COC forms, analytical data summary report pages, a QC sample results, and raw data, where applicable. Raw data are to consist of instrument preparation and calibration logs, instrument printouts of field sample results, QC sample results, calibration and maintenance records, COC check in and

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Comment [E13]: There appears to be a discrepancy in plans for how samples immediately archived are handled. I have modified this language the way I think it should be, unless there is something more going on that I am not aware of.

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tracking, raw data count sheets, spectra, micrographic photos, diffraction patterns, All original data reports will be filed in the CDM project repository in Denver, Colorado. The laboratory also will provide an electronic copy of the data to the laboratory coordinator and others as directed by CDM.

Deleted: instrument print outs of sample results

Deleted: analysis run logs, and sample preparation logs

5.6 Data Management

Sample results data will be delivered to the Volpe Center and CDM's Cambridge office both in hard copy and as an electronic data deliverable (EDD). Electronic copies of all project deliverables, including graphics, will be filed by project number. Electronic files will be routinely backed up and archived.

All results, field data sheet information, and survey forms will be maintained in the Libby project database managed by the Volpe Center.

Section 6
Assessment and Oversight

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that deviations from procedures are documented. These reports also serve to keep management current on field activities. Assessment, oversight reports, and response actions are discussed below.

6.1 Assessments

Performance assessments are quantitative checks on the quality of a measurement system and are appropriate to analytical work. Performance assessments for the laboratories may be accomplished by submitting reference material as blind reference (or performance evaluation) samples. These assessment samples are samples with known concentrations that are submitted to the laboratories without informing the laboratories that they are performance samples. Samples will be provided to the laboratories for performance assessment upon request from the EPA remedial project manager (RPM) or Volpe Center PM. Laboratory audits may be conducted upon request from the EPA RPM or Volpe Center PM.

Performance samples will be submitted to each laboratory analyzing samples associated with this investigation. The submission frequency will be at least once every three months.

System assessments are qualitative reviews of different aspects of project work to check on the use of appropriate QC measures and the functioning of the QA system. Project assessments will be performed under the direction of the QA managers, who report directly to the CDM president. Quality Procedure 6.2, as defined in the CDM QA Manual (CDM 2005a), defines CDM 's corporate assessments, procedures, and requirements. Due to the amount of sampling and the duration of the Libby project, both a field audit and an office audit are scheduled for the Site annually.

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6. 2 Response Actions

Response actions will be implemented on a case-by-case basis to correct quality problems. Minor response actions taken in the field to immediately correct a quality problem will be documented in the applicable field logbook and a verbal report will be provided to the CDM PM. For verbal reports, the CDM PM will complete a communication log to document the response actions were relayed to him/her. Major response actions taken in the field will be approved by the CDM PM, the EPA RPM, and Volpe PM prior to implementation of the change. Major response actions are those that may affect the quality or objective of the investigation. Quality problems that cannot be corrected quickly through routine procedures may require implementation of a corrective action request (CAR) form.

All formal response actions will be submitted to either CDM 's QA manager and/or project QA coordinator for review and issuance. CDM 's PM or local QA coordinator will notify the QA manager when quality problems arise that may require a formal response action. CAR forms will be completed according to Quality Procedure 8.1 of

the CDM QA Manual (CDM 2005a).

In addition, when modifications to this specific SAP are required either for field or laboratory activities Libby Asbestos Project Record of Modification Form (Appendix C) must be completed.

6.3 Reports to Management

QA reports will be provided to management whenever quality problems are encountered. Field staff will note any quality problems on field data sheets, or in field logbooks. CDM 's PM will inform the project QA coordinator upon encountering quality issues that cannot be immediately corrected. Weekly reports and change request forms are not required for this work assignment. Monthly QA reports will be submitted to CDM 's QA manager by the project QA coordinator.

Topics to be summarized regularly may include but not be limited to:

- Document technical and QA reviews that have been conducted
- Activities and general program status
- Project meetings
- Corrective action activities
- Any unresolved problem
- Any significant QA/QC problems not included above

Section 7
Data Validation and Usability

Laboratory results will be reviewed for compliance with project objectives. Data validation and evaluation are discussed in Sections 7.1 and 7.2, respectively.

7.1 Data Review, Validation, and Verification Requirements

No formal data validation for these media is currently required of CDM. At the request of Volpe Center, CDM will validate data submitted by analytical laboratories. Data validation consists of examining the sample data package(s) against pre-determined standardized requirements. The validator may examine, as appropriate, the reported results, QC summaries, case narratives, COC information, raw data, initial and continuing instrument calibration, and other reported information to determine the accuracy and completeness of the data package. During this process, the validator will verify that the analytical methodologies were followed and QC requirements were met. The validator may recalculate selected analytical results to verify the accuracy of the reported information. Analytical results will then be qualified as necessary.

Data verification includes checking that results have been transferred correctly from laboratory data printouts to the laboratory report and to the EDD. Data verification for this project is primarily performed as a function of built-in quality control checks in the Libby project database when data is uploaded. However, the sample coordinator will notify the laboratories and the project database manager (Mr. Mark Raney, Volpe Center) of any discrepancies found during data usage.

7.2 Reconciliation with Data Quality Objectives

Once data has been generated, CDM evaluates data to determine if DQOs were achieved. This achievement will be discussed in the measurement report, including the data and any deviations to this SAP. Sample data will be maintained in a Microsoft Access database. Laboratory QC sample data will be stored in hard copy (in the project files) and in a separate database.

Section 8
References

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Deleted: Letter from Bill Murray to readers of the Draft Internal USEPA Region 8 Working Document entitled "Summary of Asbestos Levels in Ambient Air in Libby, Montana". June 23.